SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XXIII.--No. 16. [NEW SERIES.] NEW YORK, OCTOBER 15, 1870. $3 per Annum [IN ADVANCE.]

Improved Stump Extractor.

Our engraving represents a new and improved stump extractor which may also be applied to the raising of heavy weights to load them on trucks in place of the ordinary derrick. Its power may be made to reach any extent within the limits of strength of the materials of which it is constructed.

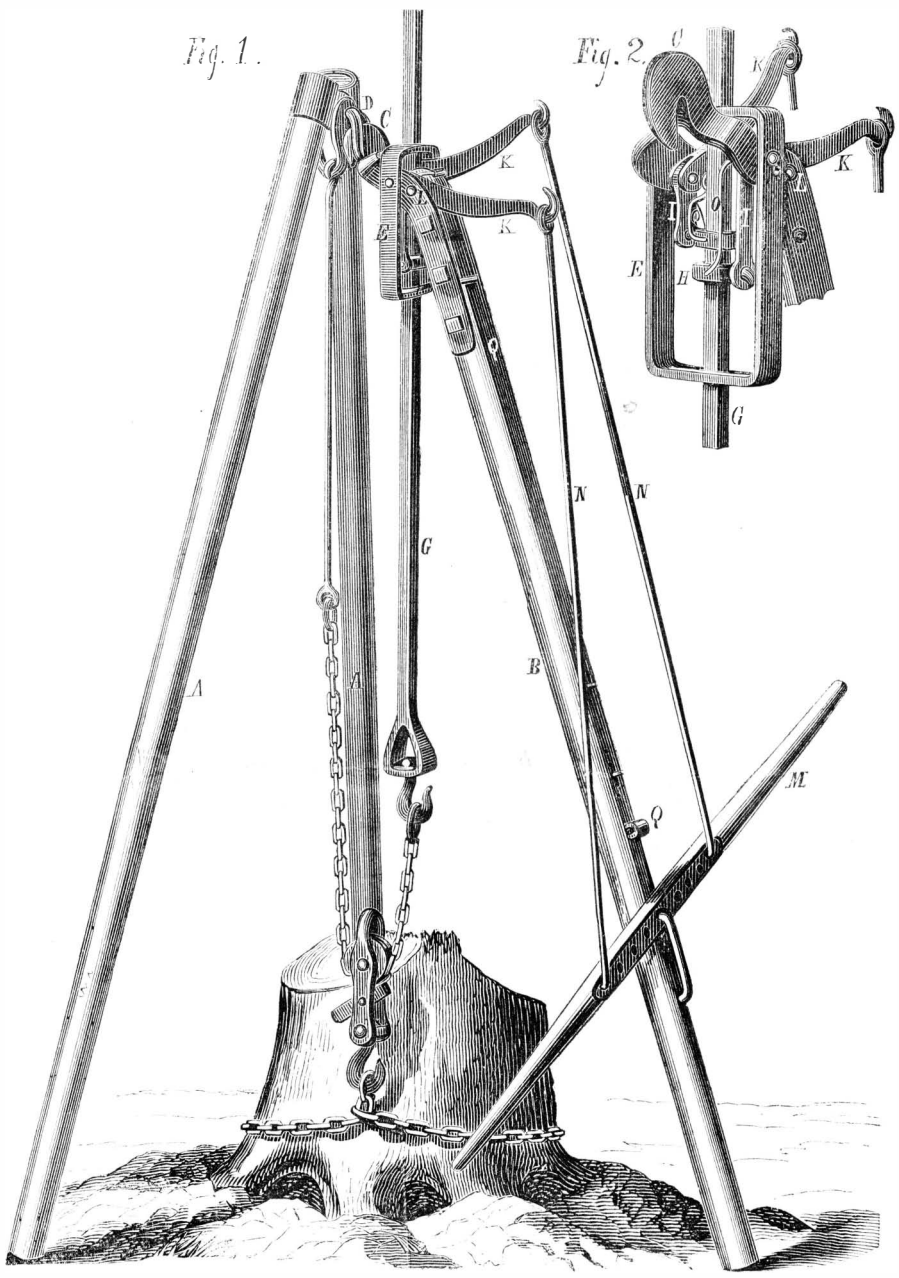
The frame is composed of two legs, A, and the leg, B, hooked together at the top by the long crotched and bent hook, C, and the swivel, D. E is a metal frame suspended on the hook, C, by pivot bolts. G is a square hoisting bar, arranged to slide up and down through suitable holes in the top and bottom of the frame, E. Gripe pawls, H, with square holes, through which the bar, G, passes, are suspended by rods, I, from the short arms of the levers, K, pivoted on the axis, L, and connected at their long ends to the vibrating hand lever, M, by the rods, N, one on each side of its axis, so that when one moves one way the other moves the other way. The gripe pawls, H, are also connected by small rods, O, to the spring levers, F, also pivoted on the axis, L, and connected to the bar, Q, on the leg, B, the bar, Q, being arranged to slide up and down on leg, B.

When this bar, Q, is shoved up, the spring levers press the pawls down and cause them to grip the bar as soon as the levers, K, begin to draw them up, thereby causing the bar to be raised by the alternate up-and-down movement of the pawls, and when the bar, Q, is shoved down, the springs have a lifting action on the pawls which prevent their gripping the bar, until near the end of the upward movement of the levers; so that the further upward movement will lift the bar out of the grip of the pawls below, which being thereby freed, will rise on the bar while it is lowered by the other, until near the end of its upward movement, when, as before, this one will grip and force the bar from the other at the lower position, and so on, letting the bar down.

The springs thus shift the pawls readily to cause them to raise or lower the bar, as may be required. The swinging frame gives the bar freedom to work obliquely to either side of the vertical position, and in case it requires to vibrate perpendicularly thereto the hook and leg, K, will vibrate in that direction.

By shifting the lever rods, I, into holes nearer the central pivot of the hand-lever, M, the speed is reduced and the lifting power is increased, and *vice versa*. The tripod form of the machine also adapts it for use on rough and uneven land.

Patented, through the Scientific American Patent Agency, May 3, 1870, by George L. Howland and Wm. M. Howland, of Topsham, Me., whom address for further information.



GEORGE L. AND WILLIAM M. HOWLAND'S STUMP EXTRACTOR.

The "Instrument Room" of the Electric Telegraph, of London.

This room, the most sensitive spot in the whole world—the cerebrum which receives and transmits intelligence from all quarters of the globe—may be looked upon as one of the most curious sights in the metropolis. Although hundreds of minds are simultaneouly conversing, some with tongues of steel, some with the clear sound of the bell, some again by means of piano-like notes, which spell the words letter by letter, although we have the clatter of all these sounds mixed with the metallic tinkle of the electric bell, hailing from distant western and northern cities—not a human voice is heard—although, stranger still, the manipulators are all women. According to the rules of the service, the swifter they talk the better; but it must be done in silence with some unseen correspondent at the extremity, it may be, of the kingdom—a necessary condition in order to insure attention and accuracy while the operators are at work.

It is certainly no unpleasant sight to see these young women doing the work of the world, proving that they are capable of thoughtful labor, and trustworthy in circumstances of great pith and moment. It is discovered at last that the sewing needle is not the only instrument they can master. They are evidently drawn from the middle rank of life; and we are informed that they make capital manipulators, the delicacy of their fingers seeming to point out to them the telegraph instrument as a suitable means of employment.

. . . While the visitor is listening to the clatter of one half of the world talking to the other half, he is aware of a dull thud striking from time to time upon the ear. On inquiry, he finds this strange sound proceeds from the pneumatic tube, the new servant the electric telegraph has called to its aid; and within a glass case, against the wall, he sees trained just like so many fruit trees in an orchard house long tubes of gutta-percha, ending in an oblong-shaped mouth, covered with thick plate-glass. As he is watching, a long round pellet is projected into this reception case with the force of a spent shot—taken out by the clerk in attendance—and immediately opened. It contains a telegraphic message, sent here for transmission to some other wire.

This pneumatic tube at present is only extended to offices half a mile round, but as this half mile is in the busiest part of the city, an area in whichit is difficult to get along fast by foot-passengers, porterage-work is done in seconds as compared to minutes by this fleetmechanical messenger. Eventually all the great district post-offices will be connected with the central office by pneumatc tubes, thus vastly accelerating the speed of the telegrams.

In addition to the offices within half a mile of Telegraph street, which are thus servedby this aerial mercury, the head office at St. Martin's-le-Grand is provided with a tube. The great submarine cables, suchas the Atlantic, the Indian, and all the marine lines wishing to use the central office as a means of forwarding messages, will have lines of tube to this room for that purpose. If the reader remembers his old pea-shooter days, he will undersand their principle of action in a moment. If he blows he impels the pea, if he sucks he draws it up into his mouth. Pressure and suction are the two forces used in this pea or mesage-shooter of our maturer days.

The telegraph message comes in a round plug box, covered with carpet or flannel, so as ust to make it fit loosely the tube. The suction and propulsive power lies in the depths of the establishment, in the nape of a steam engine.—*Edinburgh Review.*

Kid Gloves.

A correspondent of the Bostn *Advertiser* says: I hope that some of your readers availe themselves of an intimation contained in a recent letter, that, owing to the disturbance to French industry, the price of kid gloves would probably advance. On the 8th ladies' gloves with one button were advanced one dollar per dozen, and on the 19th, another dollar; and so in proportion for other styles. The largest manufacturer for this country is Alexandré, who supplies one house in New York with between sixty and seventy thousand dozen pairs of kid gloves per annum. As his principal factory for cutting is in Paris, his shipments have stopped, and his house states that the resumption will depend on the contingencies of the war.

Mr. Muller, who stamps his given name of Alexandré upon the gloves, when first known to Mr. Stewart was in humble circumstances, needing capital to enlarge his industry; but his merit being discovered, the want was supplied, and an enormous establishment is the result. Mr. Muller owns an hotel in Paris for a winter residence, and possesses La Grange, with its sixty bedrooms and fifteen hundred acres of land distinguished in former years as the home of Lafayette. His hospitality corresponds with these important dwellings. He manufactures his own champagne, claret, and brandy, each of a fine quality.

On a visit to me some years ago he gave me the history of this manufacture. The opinion was then quite common that rat skins were used, which he disposed of very summarily. Besides other objections, said he, it is enough to mention that they would be much too short for the hand. In order to purchase kid skins he sends out his agents as early as February to Italy, and they follow the mountain ranges, keeping pace with the opening of spring, until they reach to the plains of the Baltic. Fields which will carry sheep are not used for the goat in flocks. The goat is driven up to nearly the snow line of mountains to feed on the tender branches of shrubs and trees, and they are tended and milked by a class which is not seen in this country.

In walking up the Alps I have found these interesting flocks. The horns of the animal supply handles for knives, its hair is used for cloth, its milk for cheese, its flesh for food—that of the young kid being excellent—and the skin isdisplayed on fair hands in all civilized countries. It will be years before this entire industry will be introduced into the United States. I should not be surprised if Prussia, availing herself of the opportunity which the disturbed industry of France offers, should become distinguished in this manufacture.

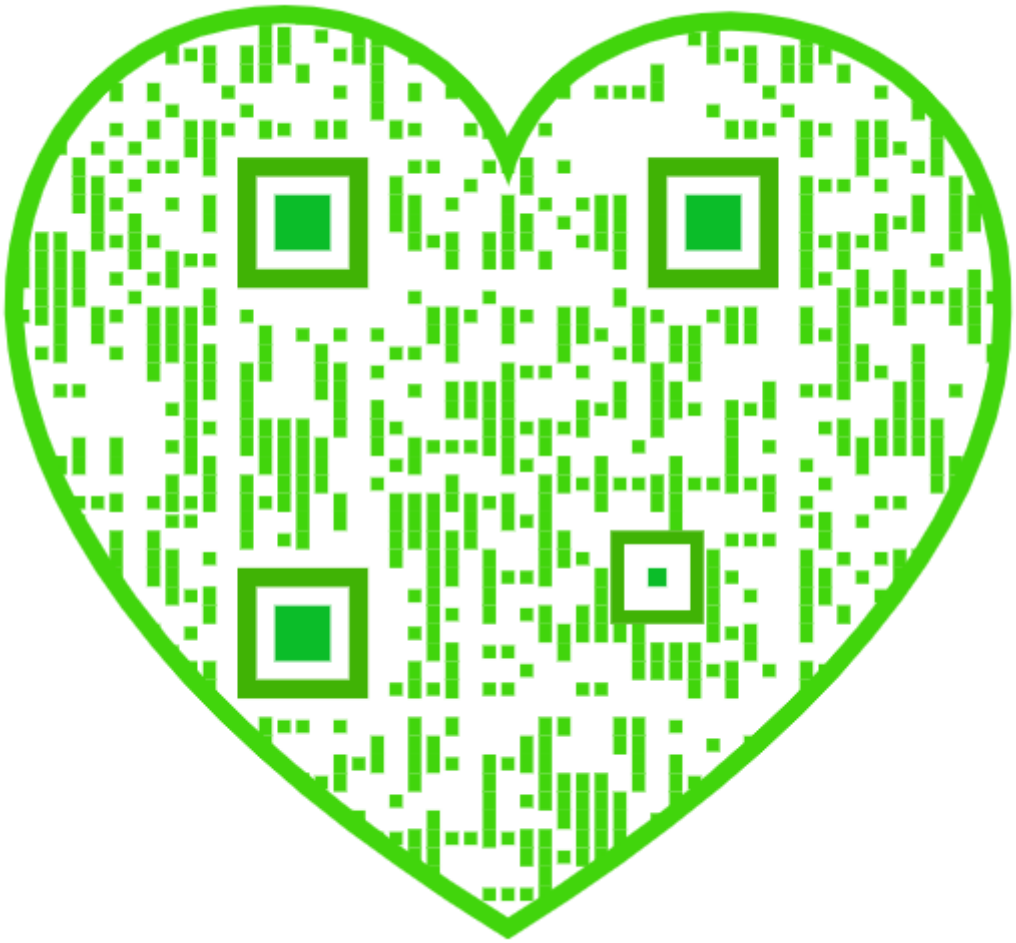
The compensation for sewing is too small to enlist the regular and permanent industry of women, and it is resorted to somewhat as knitting by hand is among us, at intervals in ordinary labor. The movement of the needle is guided by the notches of a steel clamp held by the sewer, who presently arrives at the experience which permits the work to be done while conversation is engaging part of the attention, and indeed while the eye is directed to a different quarter. It is owing to this facility that a sligh reward for the labor is exacted. The sewers are distributed all over France, and receive the material, cut out with precision, and put up in bundles of a dozen pairs.

In order to conduct the distribution of the gloves here with advantage, their form, color, and shade are fixed upon here. Colors which were in demand a year ago are rejected now, and others have taken their place. The closest attention to the probable variations in the public taste must be observed. You would be surprised to see the sample-book shades furnished for the purpose of preparing orders. They represent every tint which our knowledge of nature and art supplies.

No one is competent to say when this branch of industry in Paris will be fully resumed. The vicissitudes of war will not reach it to the extent of damaging the consumer, so far as the manufacture of Alexandré is concerned, for his gloves are not used at home. It may therefore be rapidly restored on the cessation of hostilities. English gloves have not advanced.

In Georgetown, Cal., the largest silver button ever produced in the United States was taken out by J. W. Watson, superintendent of the Brown Silver Mining Company. It weighs 1,141 pounds troy. The button was the result of 33 tuns of ore.

© 1870 SCIENTIFIC AMERICAN, INC.



INAUGURAL ADDRESS OF THE PRESIDENT, THOMAS H. HUXLEY, LL.D., F.R.S., ETC., BEFORE THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

[Concluded from page 225].

To sum up the effect of this long chain of evidence:

It is demonstrable, that a fluid eminently fit for the development of the lowest forms of life, but which contains neither germs nor any protein compound, gives rise to living things in grea abundance, if it is exposed to ordinary air; while no such development takes place if the air with which it is in contact is mechanically freed from the solid particles which ordinarily float in it, and which may be made visible by appropriate means.

It is demonstrable that the great majority of these particles are destructible by heat, and that some of them are germs, or living particles, capable of giving rise to the same forms of life as those which appear when the fluid is exposed to unpurified air.

It is demonstrable that inoculation of the experimental fluid with a drop of liquid known to contain living particles, gives rise to the same phenomena as exposure to unpurified air.

And it is further certain that these living particles are so minute that the assumption of their suspension in ordinary air presents not the slightest difficulty. On the contrary, considering their lightness and the wide diffusion of the organisms which produce them, it is impossible to conceive that they should not be suspended in the atmosphere in myriads.

Thus, the evidence, direct and indirect, in favor of *Biogenesis* for all known forms of life, must, I think, be admitted to be of great weight.

On the other side, the sole assertions worthy of attention are, that hermetically sealed fluids, which have been exposed to great and long continued heat, have sometimes exhibited living forms of low organization when they have been opened.

The first reply that suggests itself is the probability that there must be some error about these experiments, because they are performed on an enormous scale every day, with quite contrary results. Meat, fruits, vegetables, the very materials of the most fermentable and putrescible infusions are preserved to the extent, I suppose I may say, of thousands of tuns every year, by a method which is a mere application of Spallanzani's experiment. The matters to be preserved are well boiled in a tin case provided with a small hole, and this hole is soldered up when all the air in the case has been replaced by steam. By this method they may be kept for years, without putrefying, fermenting, or getting moldy. Now this is not because oxygen is excluded, inasmuch as it is now proved that free oxygen is not necessary for either fermentation or putrefaction. It is not because the tins are exhausted of air, for *Vibriones* and *Bacteria* live, as Pasteur has shown, without air or free oxygen. It is not because the boiled meats or vegetables are not putrescible or fermentable, as those who have had the misfortune to be in a ship supplied with unskillfully closed tins well know. What is it, therefore, but the exclusion of germs? I think that Abiogenesists are bound to answer this question before they ask us to consider new experiments of precisely the same order.

And in the next place if the results of the experiments I refer to are really trustworthy, it by no means follows that Abiogenesis has taken place. The resistance of living matter to heat is known to vary within considerable limits, and to depend, to some extent, upon the chemical and physical qualities of the surrounding medium. But if, in the present state of science, the alternative is offered us, either germs can stand a greater heat than has been supposed, or the molecules of dead matter, for no valid or intelligible reason that is assigned, are able to rearrange themselves into living bodies, exactly such as can be demonstrated to be frequently produced in another way, I cannot understand how choice can be, even for a moment, doubtful.

But though I cannot express this conviction of mine too strongly, I must carefully guard myself against the supposition that I intend to suggest that no such thing as abiogenesis ever has taken place in the past, or ever will take place in the future. With organic chemistry, molecular physics, and physiology yet in their infancy, and every day making prodigious strides, I think it would be the hight of presumption for any man to say that the conditions under which matter assumes the properties we call "vital" may not, some day, be artificially brought together. All I feel justified in affirming is, that I see no reason for believing that the feat has been performed yet.

And, looking back through the prodigious vista of the past, I find no record of the commencement of life, and, therefore, I am devoid of any means of forming a definite conclusion as to the conditions of its appearance. Belief, in the scientific sense of the word, is a serious matter, and needs strong foundations. To say, therefore, in the admitted absence of evidence, that I have any belief as to the mode in which the existing forms of life have originated, would be using words in a wrong sense. But expectation is permissible where belief is not; and if it were given me to look beyond the abyss of geologically recorded time to the still more remote period when the earth was passing through physical and chemical conditions, which it can no more see again than a man can recall his infancy, I should expect to be a witness of the evolution of living protoplasm from not living matter. I should expect to see it appear under forms of great simplicity, endowed, like existing fungi, with the power of determining the formation of new protoplasm from such matters as ammonium carbonates, oxalates, and tartrates, alkaline and earthy phosphates, and water, without the aid of light. That is the expectation to which analogical reasoning leads me; but I beg you once more to recollect that I have no right to call my opinion anything but an act of philosophical faith.

So much for the history of the progress of Redi's great doctrine of Biogenesis, which appears to me, with the limitations I have expressed, to be victorious along the whole line at the present day.

As regards the second problem offered to us by Redi, whether Xenogenesis obtains, side by side with Homogenesis; whether, that is, there exist not only the ordinary living things, giving rise to offspring which run through the same cycle as themselves, but also others, producing offspring which are of a totally different character from themselves, the researches of two centuries have led to a different result. That the grubs found in galls are no product of the plants on which the galls grow, but are the result of the introduction of the eggs of insects into the substance of these plants, was made out by Vallisnieri, Reaumur, and others, before the end of the first half of the eighteenth century. The tape-worms, bladder-worms, and flukes continued to be a stronghold of the advocates of Xenogenesis for a much longer period. Indeed, it is only within the last thirty years that the splendid patience of Von Siebold, Van Beneden, Leuckart, Küchenmeister, and other helminthologists, has succeeded in tracing every such parasite, often through the strangest wanderings and metamorphoses, to an egg derived from a parent actually or potentially like itself; and the tendency of inquiries elsewhere has been in the same direction. A plant may throw off bulbs, but these, sooner or later, give rise to seeds or spores, which develop into the original form.

A polype may give rise to Medusæ, or a pluteus to an Echinoderm, but the Medusa and the Echinoderm give rise to eggs which produce polypes or plutei, and they are therefore only stages in the cycle of life of the species.

But if we turn to pathology it offers us some remarkable approximations to true Xenogenesis.

As I have already mentioned, it has been known since the time of Vallisnieri and of Reaumur that galls in plants and tumors in cattle are caused by insects which lay their eggs in those parts of the animal or vegetable frame of which these morbid structures are outgrowths. Again, it is a matter of familiar experience to everybody that mere pressure on the skin will give rise to a corn. Now the gall, the tumor, and the corn are parts of the living body, which have become, to a certain degree, independent and distinct organisms. Under the influence of certain external conditions, elements of the body which should have developed in due subordination to its general plan, set up for themselves and apply the nourishment which they receive to their own purposes.

From such innocent productions as corns and warts there are all gradations to the serious tumors which, by their mere size and the mechanical obstruction they cause, destroy the organism out of which they are developed; while, finally, in those terrible structures known as cancers the abnormal growth has acquired powers of reproduction and multiplication, and is only morphologically distinguishable from the parasitic worm, the life of which is neither more nor less closely bound up with that of the infested organism.

If there were a kind of diseased structure, the histological elements of which were capable of maintaining a separate and independent existence out of the body, it seems to me that the shadowy boundary between morbid growth and Xenogenesis would be effaced. And I am inclined to think that the progress of discovery has almost brought us to this point already. I have been favored by Mr. Simon with an early copy of the last published of the valuable "Reports on the Public Health," which, in his capacity of their medical officer, he annually presents to the lords of the Privy Council. The appendix to this report contains an introductory essay "On the Intimate Pathology of Contagion," by Dr. Burdon Sanderson, which is one of the clearest, most comprehensive, and well reasoned discussions of a great question which has come under my notice for a long time. I refer you to it for details and for the authorities for the statements I am about to make.

You are familiar with what happens in vaccination. A minute cut is made in the skin, and an infinitesimal quantity of vaccine matter is inserted into the wound. Within a certain time a vesicle appears in the place of the wound, and the fluid which distends this vesicle is vaccine matter, in quantity a hundred or a thousand fold that which was originally inserted. Now, what has taken place in the course of this operation? Has the vaccine matter by its irritative property produced a mere bliste, the fluid of which has the same irritative property? Or does the vaccine matter contain living particles which have grown and multiplied where they have been planted? The observations of M. Chauveau, extended and confirmed by Dr. Sanderson himself, appear to leave no doubt upon this head Experiments, similar in principle to those of Helmholz on fermentation and putrefaction, have proved that the active element in the vaccine lymph is non-diffusible, and consists of minute particles exceeding $\frac{1}{20000}$ of an inch in dimeter, which are made visible in the lymph by the microsope. Similar experiments have proved that two of the mostdestructive of epizootic diseases, sheep-pox and glanders, ae also dependent for their existence and their propagation upon extremely small living solid particles, to which the title of *microzymes* is applied. An animal suffering under eitherof these terrible diseases is a source of infection and contagion to others for precisely the same reason as a tub of fermenting beer is capable of propagating its fermentation by "infecion" or "contagion" to fresh wort. In both cases it is the solid living particles which are efficient; the liquid in which thy float, and at the expense of which they live, being altogether passive.

Now arises the question, are these microzymes the results of *Homogenesis* or *Xenogenesis;* are they capable, like the *Torulæ* of yeast, of arising only by the development of pre-existing germs, or may they be, like the constituents of the nut gall, the results of a modification and individualization of the tissues of the body in which they are found, resulting from the operation of certain conditions? Are they parasites in the zoological sense, or are they merely what Virchow has called "heterologous growths"? It is obvious that this question has the most profound importance, whether we look at it from a practical or from a theoretical point of view. A parasite may be stamped out by destroying its germs, but a pathological product can only be annihilated by removing the conditions which give rise to it.

It appears to me that this great problem will have to be solved for each zymotic disease separately, for analogy cuts two ways. I have dwelt upon the analogy of pathological modifications, which is in favor of the xenogenetic origin of microzymes; but I must now speak of the equally strong analogies in favor of the origin of such pestiferous particles by the ordinary process of the generation of like from like.

It is, at present, a well established fact that certain diseases, both of plants and animals, which have all the characters of contagious and infectious epidemics, are caused by minute organisms. The smut of wheat is a well known instance of such a disease, and it cannot be doubted that the grape disease and the potato disease fall under the same category. Among animals insects are wonderfully liable to the ravages of contagious and infectious diseases caused by microscopic *Fungi*.

In autumn it is not uncommon to see flies motionless upon a window pane, with a sort of magic circle in white drawn round them. On microscopic examination the magic circle is found to consist of innumerable spores, which have been thrown off in all directions by a minute fungus called *Empusa muscæ*, the spore-forming filaments of which stand out like a pile of velvet from the body of the fly. These spore-forming filaments are connected with others which fill the interior of the fly's body like so much fine wool, having eaten away and destroyed the creature's viscera. This is the full-grown condition of the *Empusa*. If traced back to its earlier stages in flies which are still active and to all appearance healthy, it is found to exist in the form of minute corpuscles which float in the blood of the fly. These multiply and lengthen into filaments, at the expense of the fly's substance; and when they have at last killed the patient, they grow out of its body, and give off spores. Healthy flies shut up with diseased ones catch this mortal disease and perish like the others. A most competent observer, M. Cohn, who studied the development of the *Empusa* in the fly very carefully, was utterly unable to discover in what manner the smallest germs of the *Empusa* got into the fly. The spores could not be made to give rise to such germs by cultivation; nor were such germs discoverable in the air or in the food of the fly. It looked exceedingly like a case of Abiogenesis, or, at any rate, of Xenogenesis; and it is only quite recently that the real course of events has been made out. It has been ascertained that when one of the spores falls upon the body of a fly it begins to germinate, and sends out a process which bores its way through the fly's skin; this, having reached the interior cavities of its body, gives off the minute floating corpuscles which are the earliest stage of the *Empusa*. The disease is "contagious," because a healthy fly coming in contact with a diseased one, from which the spore bearing filaments protrude, is pretty sure to carry off a spore or two. It is "infectious," because the spores become scattered about all sorts of matter in the neighborhood of the slain flies.

The silkworm has long been known to be subject to a very fatal contagious and infectious disease called the *Muscardine*. Audouin transmitted it by inoculation. This disease is entirely due to the development of a fungus *Botrytis Bassiana*, in the body of the caterpillar; and its contagiousness and infectiousness are accounted for in the same way as those of the fly disease. But of late years a still more serious epizootic has appeared among the silkworms; and I may mention a few facts which will give you some conception of the gravity of the injury which it has inflicted on France alone.

The production of silk has been, for conturies, an important branch of industry in Southern France, and in the year 1853 it had attained such a magnitude that the annual produce of the French sericulture was estimated to amount to a tenth of that of the whole world, and represented a money value of 117,000,000 of francs, or nearly five millions sterling. What may be the sum which would represent the money value of all the industries connected with the working up of the raw silk thus produced is more than I can pretend to estimate. Suffice it to say that the city of Lyons is built upon French silk, as much as Manchester was upon American cotton before the civil war.

Silkworms are liable to many diseases; and even before 1853, a peculiar epizootic, frequently accompanied by the appearance of dark spots upon the skin (whence the name of Pébrine" which it has received), had been noted for its mortality. But, in the years following 1853 this malady broke out with such extreme violence that in 1856 the silk crop was reduced to a third of the amount which it had reached in 1853; and, up till within the last year or two it has never attained half the yield of 1853. This means not only that the great number of people engaged in silk growing are some thirty millions sterling poorer than they might have been; it means not only that high prices have had to be paid for imported silkworm eggs, and that, after investing his money in them, in paying for mulberry leaves and for attendance, the cultivator has constantly seen his silkworms perish and himself plunged in ruin—but it means that the looms of Lyons have lacked employment, and that for years enforced idleness and misery have been the portion of a vast population which in former days was industrious and well to do.

© 1870 SCIENTIFIC AMERICAN, INC.

In 1858 the gravity of the situation caused the French Academy of Sciences to appoint commissioners, of whom a distinguished naturalist, M. de Quatrefages, was one, to inquire into the nature of this disease, and, if possible, to devise some means of staying the plague. In reading the report, made by M. de Quatrefages, in 1859, it is exceedingly interesting to observe that his elaborate study of the Pébrine forced the conviction upon his mind that, in its mode of occurrence and propagation, the disease of the silkworm is, in every respect, comparable to the cholera among mankind. But it differs from the cholera, and, so far, is a more formidable disease in being hereditary, and in being, under some circumstances, contagious as well as infectious.

The Italian naturalist, Filippi, discovered in the blood of the silkworms affected by this strange disease a multitude of cylindrical corpuscles, each about $\frac{1}{6000}$ of an inch long. These have been carefully studied by Lebert, and named by him *Panhistophyton;* for the reason that, in subjects in which the disease is strongly developed, the corpuscles swarm in every tissue and organ of the body, and even pass into the undeveloped eggs of the female moth. But are these corpuscles causes or mere concomitants of the disease? Some naturalists took one view and some another; and it was not until the French Government, alarmed by the continued ravages of the malady, and the inefficiency of the remedies which had been suggested, despatched M. Pasteur to study it, that the question received its final settlement, at a great sacrifice, not only of the time and peace of mind of that eminent philosopher, but, I regret to have to add, of his health.

But the sacrifice has not been in vain. It is now certain that this devastating, cholera-like Pébrine is the effect of the growth and multiplication of the *Panhistophyton* in the silkworm. It is contagious and infectious, because the corpuscles of the *Panhistophyton* pass away from the bodies of the diseased caterpillars, directly or indirectly, to the alimentary canal of healthy silkworms in their neighborhood; it is hereditary, because the corpuscles enter into the eggs while they are being formed, and, consequently are carried within them when they are laid; and for this reason, also, it presents the very singular peculiarity of being inherited only on the mother's side. There is not a single one of all the apparently capricious and unaccountable phenomena presented by the Pébrine but has received its explanation from the fact that the disease is the result of the presence of the microscopic organism, *Panhistophyton.*

Such being the facts with respect to the Pébrine, what are the indications as to the method of preventing it? It is obvious that this depends upon the way in which the *Panhistophyton* is generated. If it may be generated by Abiogenesis or by Xenogenesis within the silkworm or its moth, the extirpation of the disease must depend upon the prevention of the occurrence of the conditions under which this generation takes place. But if, on the other hand, the *Panhistophyton* is an independent organism, which is no more generated by the silkworm than the mistletoe is generated by the oak or the apple-tree on which it grows, though it may need the silkworm for its development, in the same way as the mistletoe needs the tree, then the indications are totally different. The sole thing to be done is to get rid of and keep away the germs of the *Panhistophyton.* As might be imagined from the course of his previous investigations, M. Pasteur was led to believe that the latter was the right theory; and, guided by that theory, he has devised a method of extirpating the disease which has proved to be completely successful wherever it has been properly carried out.

There can be no reason, then, for doubting that, among insects, contagious and infectious diseases of great malignity are caused by minute organisms which are produced from pre-existing germs, or by Homogenesis; and there is no reason that I know of for believing that what happens in insects may not take place in the highest animals. Indeed, there is already strong evidence that some diseases of an extremely malignant and fatal character to which man is subject are as much the work of minute organisms as is the Pébrine. I refer, for this evidence, to the very striking facts adduced by Professor Lister in his various well known publications on the antiseptic method of treatment. It seems to me impossible to rise from the perusal of those publications without a strong conviction that the lamentable mortality which so frequently dogs the footsteps of the most skillful operator, and those deadly consequences of wounds and injuries which seem to haunt the very walls of great hospitals, and are, even now, destroying more men than die of bullet or bayonet, are due to the importation of minute organisms into wounds, and their increase and multiplication, and that the surgeon who saves most lives will be he who best works out the practical consequences of the hypothesis of Redi.

I commenced this address by asking you to follow me in an attempt to trace the path which has been followed by a scientific idea in its long and slow progress from the position of a probable hypothesis to that of an established law of nature. Our survey has not taken us into very attractive regions; it has lain, chiefly, in a land flowing with the abominable, and peopled with mere grubs and moldiness. And it may be imagined with what smiles and shrugs practical and serious cotemporaries of Redi and of Spallanzani may have commented on the waste of their high abilities in toiling at the solution of problems which, though curious enough in themselves, could be of no conceivable utility to mankind.

Nevertheless, you will have observed that, before we had traveled very far upon our road, there appeared, on the right hand and on the left, fields laden with a harvest of golden grain, immediately convertible into those things which the most sordidly practical of men will admit to have value—viz., money and life.

The direct loss to France caused by the Pebrine in seventeen years cannot be estimated at less than fifty millions sterling; and if we add to this what Redi's idea, in Pasteur's hands, has done for the wine grower and the vinegar maker, and try to capitalize its value, we shall find that it will go a long way towards repairing the money losses caused by the frightful and calamitous war of this autumn.

And, as to the equivalent of Redi's thought in life, how can we over-estimate the value of that knowledge of the nature of epidemic and epizootic diseases, and, consequently, of the means of checking or eradicating them, the dawn of which has assuredly commenced?

Looking back no further than ten years it is possible to select three (1863, 1864, and 1869) in which the total number of deaths from scarlet fever alone amounted to 90,000. That is the return of killed, the maimed and disabled being left out of sight. Why, it is to be hoped that the list of killed in the present bloodiest of all wars will not amount to more than this! But the facts which I have placed before you must leave the least sanguine without a doubt that the nature and the causes of this scourge will one day be as well understood as those of the Pébrine are now, and that the long-suffered massacre of our innocents will come to an end.

And thus mankind will have one more admonition that "the people perish for lack of knowledge;" and that the alleviation of the miseries and the promotion of the welfare of men must be sought, by those who will not lose their pains, in that diligent, patient, loving study of all the multitudinous aspects of nature, the results of which constitute exact knowledge or science.

It is the justification and the glory of this great meeting that it is gathered together for no other object than the advancement of the moiety of science which deals with those phenomena of nature which we call physical. May its endeavors be crowned with a full measure of success!

COSTUME AND ART.

[From The Building News.]

Costume may be usefully divided into *three* kinds or modes of clothing the "naked animal man." The first may be typified by the old Greek dress, where the evident object was to hide the figure as little as possible, *i.e.*, to so clothe and fit the human frame as not to hide or smother, but to show the form. The next other mode was the precise reverse of this, and was well typified in the magnificent costume of the ancient Mede, in whom the whole figure was clothed in flowing drapery, the object being to exhibit the splendor of the dress, and to add to the dignified presence of the wearer by its shape and folds. These two modes of dress may be said to represent the two opposite ways of clothing the human form, both equally good in their way, and obviously equally suitable for different people and avocations. It must be observed in passing that under these two heads there are a vast number of costumes and modes of dress all the world over, and in all ages, which will equally well typify the two systems; and a work of no small interest might be written on the subject if thus simply divided. The third mode we would venture to call the mode of *quaint* costume—the word quaint being used for want of a better. It may be represented by the dress of the Japanese, where the object would seem to be neither of the two above mentioned—neither to show the form of the wearer nor the grace of the dress, nor even folds of drapery, but simply to cover the body with some quaint device, almost like the strange figures on a common playing card. It is, perhaps, the very strangest costume that was ever invented by man; the patterns, the colors, and the odd cut of the several parts making up a gorgeous show, not a little strange and quaint, and unlike everything else. There are, under this head, too, a number of different costumes from different countries and in different ages; and much of the costume of the middle ages is of this type, and has come down to us in the glass painting in the windows of cathedrals and on the walls of churches. To this class of dress belongs that of the end of the last century and of the days of Hogarth, where a sort of odd quaintness redeemed it in a great measure from contempt. Indeed, as we see it in the paintings and prints of Hogarth, it is impossible not to be struck with its oddity; and the wig and great horseman's coat, long waistcoat, short breeches, and heavily buckled shoes, makeup together at least an harmonious whole, and the word quaint seems to be the only one which can well characterize it.

It is from this strange idea of a human dress that our modern costume of to-day comes by regular descent; and it of right must come under the same general heading, for it certainly does not belong to the Greek idea of dress, nor to the Median robe order of costume, nor, indeed, if the truth must be told, to the quaint, but is truly a thing by itself. It is simply the very stupidest thing ever yet invented by the ingenuity or perverseress of man. It comes under neither of those two leading principles which should regulate all costume, viz., either to show the form and actions of the human frame, or to exhibit the form and folds of the dress with which it is clothed; or, to go to the third and only other way, to show mere "quaintness," as we have ventured to call it, where neither of the two first requirements of dress are aimed at. It would seem, indeed, absolutely impossible to conceive anything more ungainly and inconvenient than the present system of modern fashionable male attire—the "sustained splendor" of Mr. Disraeli—for it does not allow of the form to be seen; it is nothing in itself, there being no folds or drapery, and there is in it no sort of quaint interest to make up in any way for the loss of the two prime ideas in all dress. To confine our remarks to the ordinary fashionable male costume, we may take it for granted that the dress-up of a smart waiter at a big hotel or club may be taken as fairly typical of it. The arms and legs of the old Greek were left bare, for not living under Mr. Gladstone's rule they knew nothing of the "anthropomorphic element" in fine art: so that when they wanted to draw the human arm they were content, poor, simple, ignorant souls, to look at one, and the old Greek dress allowed of it. In our improved modern system of clothing, this it is clear cannot be done, for the climate, it will be urged, compels the covering of legs and arms. Be it so. Neither, again, does the form of the dress allow of the dress to show itself, and to become a thing of beauty *per se*, or even one of convenience; for what can possibly be more ugly or awkward than the semi-tight fitting sleeve of a common coat, or the still worse and more fashionable trousers? Quaintness will not surely be charged upon them, so that neither form, comeliness, nor oddity belongs to it or to them, and certainly not mere and simple utility. Fashion does all the work.

It would be useless to go into the merits of the world-renowned swallow-tailed coat—that pride of the smart waiter, and last hope of those who glory in being dressed. Of its convenience or beauty, no one perhaps did ever yet boast, any more than they have done or do of the tight-fitting boot or tall chimney-pot and so dearly fashionable hat. They are all things which the tyrant fashion compels everybody to wear and to be perpetually inconvenienced by. It really all seems to be typical of the art of the time of this latter part of the nineteenth century, when all real and genuine art has disappeared and given place to machinery and manufacture. It would be impossible to sink lower than we now are sunk in this country—at least, in all matters appertaining to art, whether high or low; and one means of rescuing things from this most deplorable state would be, as we take it, some improvement, or say merely change, in costume; and it would seem that the only channel through which any such change or improvement is at all likely or possible is in that of our army, and in the dress and appointments of soldiers.

The tremendous and disastrous failure of that gallant and so perpetually victorious army of France has been so sudden and unexpected that no man has had time to think anything about it, or how it has ever come to pass that so magnificent a body could have suffered and lost as they have done. May it be allowed us in this place to suggest *one* cause of it—the excessive neatness, primness, and fit of the clothes of the men; everything bran new, and of the brightest and gayest colors. The man was lost in his smart tailoring. The course of the war has been so rapid that there has been no time for any one to grow shabby enough to work, or do anything, or to think of his own personal and bodily self. In the old Italian wars of the first Napoleon, the soldier wore off the smartness of his smart attire before he found himself on the battle-field, was ready for work, and thought of himself and not of his dainty clothing—all so tight, and awkward, and inconvenient, and unfit for its stern purpose. What more important subject, then, can there be than that of art combined with utility in costume, more especially in the dress of the soldier? In it most surely there ought to be combined the two prime requisites—utility and convenience, and ease of movement with sightliness and artistic beauty, and appropriateness and harmony of colors. Cobden used to say that the French were so artistic a nation, and so clever in making the most of what other people would despise and throw away as useless, that they levied a sort of tax on the whole world in the matter of setting the fashions and showing the rest of the world how to make a dress, and then how to wear it after it was made; not, by the way, so easy a feat as one might be disposed to think; but it is to be feared that they have paid a fearful price for their artistic superiority, for what with this world-taxing smart dressing and Hyde Park generalship, the nation itself is all but well nigh lost, and their Emperor quite. It cannot be amiss, therefore, to draw attention to the art of costume, and to the best possible way in which the human body may be clothed so as not to impede its movements, and yet that this costume shall be at the same time beautiful in form and harmonious in color. In military dress these two principles are fundamental requisites, as no soldier will be, or ought to be, satisfied unless he looks like a soldier. The old Greek went out to battle with his limbs as free as possible, and with a dress allowing of the utmost ease and freedom of action and movement; and may it not be a good and useful question, in case of any radical change of costume, either in the regular army or in the volunteer force, or in the formation of any new regiment, to depart a little from the conventional and fashionable type of clothing, and aim at something better and more workable and appropriate? Humanity itself is, as things now are, absolutely blotted out by the unsightly costume it is compelled to wear; and pictorial art is impossible all the time there are no living exemplars to keep the artist's eye and hand to the work he has to do. In either of the three systems of costume-making we have named there is to be found abundance of precedent and examples to go by; and the difficulty, if any there be, will be in the number, and not in the paucity of examples. Of course it will be understood that all that has been said of a required change in military costume applies equally—nay more—to civil costume; and it is in the hope of seeing some speedy change in the dress of the soldier, now generally admitted as desirable, that these few hints on the subject of costume, and the need of beauty and harmony in it, have been written.

BRONZING COPPER URNS.—The surface, first made thoroughly clean and bright, is covered with a thick coat of rouge and water; when dry, the article is placed in a clear hollow fire (say a chamber of bricks, red hot) for a short time until the rouge has turned to the desired shade of color. Then the article is placed on a suitable stand, and polished with a soft brush and rouge powder and afterwards with soft leather. The tinning and soldering are subsequent operations.

© 1870 SCIENTIFIC AMERICAN, INC.

NEW CAPITOL FOR THE STATE OF NEW YORK.

The site of the building at Albany illustrated in our present number is very commanding, being 170 ft. above the level of the Hudson, and has an area of ten acres. It is bounded on the south by State street, and on the north by Washington avenue, 100 feet in width. The land falling off rapidly to the north, south, and east, this building with its high walls, still higher pavilions, turrets, and towers, will be seen to advantage. In the exterior composition of the design, there is a general adherence to the style of the pavilions of the New Louvre, of the Hôtel de Ville of Paris, and the Maison de Commerce recently erected in the city of Lyons. The terrace which forms the grand approach to the east or principal front will form a striking feature.

The exterior is 290 feet long north and south, and 390 feet east and west. The floor immediately above the level of the plateau of the terrace will be entered through the porticos on Washington avenue and State street, and through the carriage entrance under the portico of the east front. The first or main entrance-floor will be reached by a flight of steps on the east front leading to the loggia, or hall of entrance, occupying an area of 60 feet by 74 feet, and 25 feet in hight.

Communicating directly with this hall are two grand staircases, which form the principal means of communication with the second and most important floor. On the left of this hall are a suite of rooms for the use of the Governor and his secretaries, and military staff. On the right are rooms for the Secretary of State, Attorney General, with corridor leading to the Court of Appeals.

On the second or principal floor will be placed the Senate and Assembly chambers, and the State library, all of which (in elevation) will occupy two stories, making 48 feet of hight. Rooms for the committees and other purposes will also be placed on this floor. The Senate Chamber will be 75 feet by 55 feet on the floor, with a gallery on three sides of 20 feet in width. The Assembly Chamber will be 92 feet by 75 feet on the floor, surrounded by a similar gallery, which in both chambers largely increases the areas of the upper portion. The library will occupy the whole of the east front of these two stories, and will be 283 feet long and 54 feet wide. This will be the most attractive room in the building. Its large area and lofty proportions, its view towards the north, east, and south, overlooking the city, and bringing in the valley of the Hudson and its western slopes for miles in each direction, will make it a favorite place of resort at all seasons of the year The main tower is 66 feet square, and about 320 feet in hight. In the center of the building will be an open court 137 feet by 92 feet. This court will be an attractive feature, being treated in the same manner as the exterior fronts, and will no doubt ultimately have its fountains and be surrounded with statuary. The entire structure will weigh 150,000 tuns; but the great inequalities in the hights of the various walls, and the distribution of the enormously heavy fire-proof floors, and roofs sometimes laden with deep snows, will bring very unequal weights upon the parts of the foundation adjacent to each other, and without great care they would settle unequally and crack the walls, as is so frequently seen in modern private, and even many public buildings. The stone foundation of the walls commences on concrete, and is made of large blocks of close-cut limestone of from two to six tuns weight, laid in regular courses, the first one nearly the width of the concrete, and each successive one narrowed by offsets, until the wall is contracted to the width necessary to support the superstructure, arranged so that they will afford an equal bearing on each side of the line of the centre of gravity of the walls and the weights which they are to sustain. The work has been carried on very rapidly under the direction of the Commissioners, Messrs. Hamilton, Harris, John V. L. Pruyn, O. B. Latham, James S. Thayer, Alonzo B. Cornell, William A. Rice, James Terwilliger, and John T. Hulson. The architects are Messrs. Fuller & Laver, of Albany; and Mr. W. J. McAlpine is the engineer.

The buildings are being constructed by day-work, under the immediate superintendence of Mr. J. Bridgford, a well known builder.

CAPITOL OF THE STATE OF NEW YORK.

Log Dams.

These, in a locality where timber is plenty, are cheapest, and easiest to build. If the bottom be rock or other good foundation, begin by laying a large log across the stream, at the down-stream face of the intended dam; this you will extend from bank to bank, by laying one log at the end of another, having each piece as long and large as possible, taking care to clear away everything that will wash out from under, and where hollow places occur, put short logs across under, so as to give it a safe foundation. Then put short logs across this, six or eight feet apart, their butt ends lying upon the log and their top ends upon the ground, up stream from this; you will now place another tier upon these, above and parallel with the first one, but inclining slightly up stream; then another set of short ones, their butts upon the last tier, and top end upon the ground beside the first cross ties. These must be a little shorter than the first ties to admit of laying a smallish log on the ends of the first ones, and up into the angle formed by the second ones; you can now lay "skids" upon these small logs, and proceed to roll up your third tier of large logs, along the faces. Care must be taken to notch them a little where they cross each other, to insure their lying safely, or block them secure with a stone or piece of wood where the small ends come.

Your next tier of ties must be notched well down at the small or up-stream end, and you must proportion your two parallel tiers of logs and these ties, so that the front or breast will rise enough faster than the rear to keep it like a portion of an arch, and have the cob-work, when finished, fit the rafters; that is, the larger tier of logs at the breast should support the rafters near the top, while the smaller tier at the rear should support them near the middle, and the lower ends of the rafters rest upon the rock or bottom. It will be seen that a breastwork, so constructed, is like a portion of an arch or circle, of which the foot of the raftar is the center, and the front of the breastwork the circumference; and the more weight is put upon it the stronger and more solid it becomes Care must be taken not to carry it too high, or steep, for the length of rafter (or radius), as in that case the force of water behind might slide it away in a body.

If logs are convenient, this may be covered with them, like rafters, touching each other, taking care to fit them well and chink the cracks. The moss on trees and old logs, in damp places, is good to chink these cracks, as it grows and increases in such a place, instead of washing out. Cedar bark, pounded soft like oakum, is also good. Such a covering requires but little graveling to make it tight, as the pressure of the water forces the packing down into the seams formed by the round logs, where it is not easy to wash it out, or displace it by any other means.

Such a dam is cheap, strong, and durable, where there is a constant supply of water; but on small streams liable to dry up in summer, and allow the logs to dry, and heat, and check, they very soon rot, and are therefore not to be recommended for such a situation.—*Practical Millwright and Miller.*

Henry Ward Beecher on Interest.

No blister draws sharper than the interest does. Of all industries none is comparable to that of interest. It works all day and night, in fair weather and foul. It has no sound in its footsteps, but travels fast. It gnaws at a man's substance with invisible teeth. It binds industry with its film, as a fly is bound in a spider's web. Debts roll a man over and over, binding hand and foot, and letting him hang upon the fatal mesh until the long-legged interest devours him. There is but one thing on a farm like it, and that is the Canada thistle, which swarms new plants every time you break its roots, whose blossoms are prolific, and every flower the father of a million seeds. Every leaf is an awl, every branch a spear, and every plant like a platoon of bayonets, and a field of them like an armed host. The whole plant is a torment and vegetable curse. And yet a farmer had better make his bed of Canada thistles than attempt to be at ease upon interest.

It is said that a good way to polish plaster of Paris castings, it is coat them with melted white wax, and then place them before a fire until the wax is absorbed; a considerable polish can then be obtained by friction.

© 1870 SCIENTIFIC AMERICAN, INC.

Improved Spring Bed.

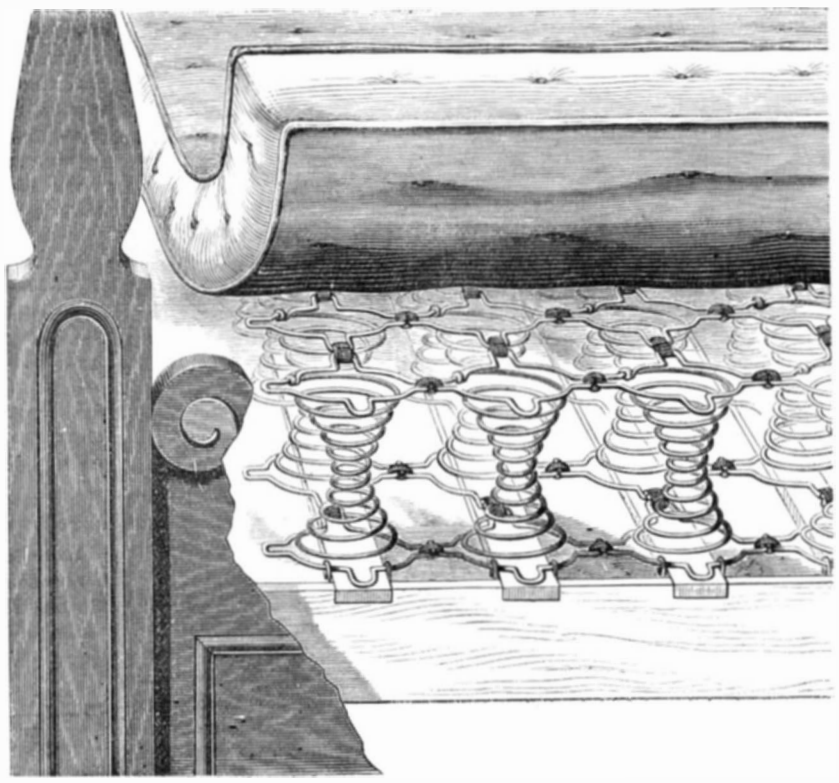
The production of a spring bed which should afford no haunt for vermin, and which should be perfectly easy and accommodating to the form, distributing the pressure equally over the entire surface, and which should at the same time be far more portable than the spring beds hitherto used, has been the object sought in the invention shown in our engraving.

It is claimed that all these objects have been attained in this device, and that it comprises all the desirable features of such beds with none of their defects. We think after a personal trial of this bed in our own residence, that these claims are fully substantiated.

The principle of construction adopted is the connection of all the springs together, so that no one can be compressed without at the same time drawing upon the others. This is accomplished by making four abrupt bends in the upper and lower convolutions of each spring, as shown, and connecting these bends by links, as indicated in the engraving.

The springs are attached at the bottom to a series of slats, as shown in the engraving, and are left entirely uncovered. In use a mattress is laid upon the springs, and when it is desired to move the bed, or pack it for transportation, the slats and springs may be rolled up together as easily as a mattress and corded together so as to be very compact.

These mattresses are on exhibition at the Fair of the American Institute. For further information address David S. Mallory, manufacturer, 385 Main street, Poughkeepsie, N.Y.



IMPROVED SPRING BED.

Manufacture of Portland Cement.

Portland cement was introduced to public notice under a patent by an Englishman nearly fifty years ago; and we have hitherto possessed a partial monopoly in its production, inasmuch as we have fortunately inexhaustible beds of the raw material from which it is made, and an abundant supply of fuel necessary for their economical manufacture. It is strange that under these conditions French engineers should have obtained the start of their professional *confreres* in this country, and that they should have been the first to demonstrate by experiments, and subsequently by the erection of magnificent harbor works on their seaboard, the valuable properties of this excellent constructive material. We may date the *extensive* employment of Portland cement in England from the commencement of the metropolitan main-drainage works. During the last fifteen years the manufacture of Portland cement has gone on steadily increasing, until at the present day we find that little short of 400,000 tuns per annum are made in the county of Kent—the center of cement manufacture—irrespective of the productions of many minor factories in different parts of the country.

The chemistry of the setting of Portland cement is by no means so well understood as it ought to be. There is no doubt, however, that, like the hydraulic lime and natural cements, it is, chemically speaking, a double silicate of lime and alumina; silicic acid is generated by the hydration of the cement, and forms insoluble salts with the lime and alumina bases. It is a curious fact that Portland cement hardens more rapidly when salt water is employed. According to Schweitzer, 1,000 grains of sea-water in the English Channel contain 27·060 grains of chloride of sodium; soluble silica has a known preference for alkaline bases, and it is not improbable, when the cement is hydrated with sea-water, that the chloride of sodium is decomposed, the silicic acid of the cement combining with the sodium and oxygen of the water, and forming thereby a silicate of soda, or a species of crude glass.

Portland cement is of two classes, which, for the sake of distinction, may be termed "Engineers'" cement and "Plasterers'" cement. The former is the more costly; it is usually described by manufacturers as "best heavy tested"; it weighs from 112lbs. to 120lbs. to the bushel, is slow setting, and of great strength: the latter is a light cement, quick setting, and of inferior strength when compared with the other. It must be understood that our remarks apply exclusively to "Engineers'" cement.

Portland cement is made from chalk and alluvial clay; the factories on the banks of the Thames use white chalk, those on the Medway gray chalk; the latter is probably preferable, inasmuch as it contains large quantities of silicious matter. Mr. Read, in his treatise on "Portland Cement," says that "the present and safest proportions, provided both chalk and clay are selected free from sand, are four parts of chalk from the Medway (gray), or three parts of Thames (white), with one of clay by measure." These materials are placed in mills of simple construction, each having a circular pan, 6ft. in diameter and 2ft. deep, in which two "edge runners," 4ft. 6in. in diameter, are kept continually going; a constant stream of water flows into the pan, and as the "edge runners" revolve, the chalk and clay are thoroughly ground, and, being thus converted into a fluid state, they filter through a band of fine brass-wire gauze fixed to the side of the pan, and flow through wooden "launders" into tanks or settling reservoirs. One washmill will feed four tanks, each of which is about 100ft. long, 40ft. broad, and 4ft. deep. When one of these has been filled in the manner just described the same process is applied to the others in succession. About three weeks after the tanks are filled the whole of the materials will be precipitated, the clear water being drained off in the mean time through a small weir in the brick side of the tank; the residuum is a plastic mixture of the consistency of "putty," and not much unlike it in color. The next process is to convey this precipitate from the tank to the "drying floors," over which it is spread in a layer about 6in. thick; each floor is 40ft. by 30ft.; it consists of an outer skin of boiler plates resting on a series of brick ovens and flues. The object of this arrangement is to render the plates sufficiently hot to effect the rapid desiccation of the water from the superincumbent layer, a process generally accomplished in about twelve hours. The materials having thus been thoroughly dried are ready for conveyance to the kilns. The "charge" consists of alternate layers of coke and raw materials, the burning generally occupying thirty-six hours. When the contents of the kiln becomes sufficiently cool, the "clinkers," or cement stones—for the mixture has now assumed that form—are drawn and removed to a floor where the larger pieces are broken, and the whole of the burnt materials are then conveyed to the hoppers of the grinding-mills, where, passing under rapidly revolving horizontal burr-stones, they are ground into an almost impalpable powder. The cement issues from the mill at a temperature of about 160°, and the now manufactured material is wheeled away, and placed in a layer from 2ft. to 3ft. thick over the floor of a cool shed; it is subsequently packed in casks or sacks for conveyance from the works. The essential conditions for the manufacture of good Portland are: 1. The chalk and clay should be thoroughly mixed in the wash-mills, and the fluid materials delivered by "launders" over the *entire* area of the settling tanks. 2. The contents of the kilns ought to be burnt equally throughout. 3. The burnt materials should be ground very fine. 4. After coming from the mill the cement should be spread over the floor of a shed, and allowed to remain there for *at least* a fortnight previously to being packed into casks or sacks.

The strength of Portland cement increases as its specific gravity increases; the tensile tests are usually made with briquettes the standard size for the neck being 1½in. by 1½in.; and it must be understood that all experiments referred to have reference to the weight necessary to sever 2¼ square inches of neat cement.

It appears from Mr. Grant's valuable paper, read before the Institution of Civil Engineers in December, 1865, that Portland cement gains from 20 to 30 per cent in strength by setting under water; it is usual, therefore, to place the best briquettes in water, after gaging, and to allow them to remain there until they are to be tested. The following table has been compiled from a recent series of experiments; it shows the average tensile strength of Portland cement as compared with the natural cements; the test blocks were of standard size of 2¼ square inches, and placed in water as before described:

	Weight per bushel.	Breaking weight two days old.	Breaking weight four days old.	Breaking weight seven days old.
	lbs.	lbs.	lbs.	lbs.
Portland cement	119	598	914	1,024
Roman cement	76	200	240	280
Medina cement	69	220	313	313
Cement de Zumaya (Spanish)	84	206	...	409

The *Builders' Trade Circular* vouches for the accuracy of these figures.

Mr. Grant's tables show conclusively that the strength of gaged Portland cement increases with age; from his experiments it appears that the breaking weight of rest blocks, one week old, one year old, and two years old, are as 1, 1·5, and 1·62. The ultimate maximum tensile strength has not as yet been ascertained; experiments are, however, being conducted periodically with a view to determine this important point. Mr. Grant gives the average tensile strength of cement weighing 119lbs to the bushel as 777lbs., whereas we give it as 1,024lbs., the excess of the breaking weight as recorded by us may probably be accounted for by improved manufacture since Mr. Grant's experiments were made.

Portland cement now forms an important item in the list of our manufactures, but even now its valuable properties are not as fully appreciated as they deserve to be.—*Eng. Mech'ic*

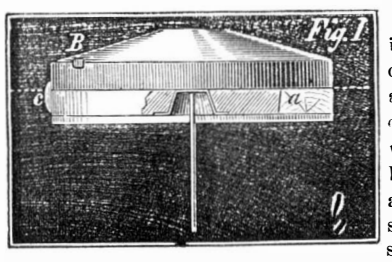
Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

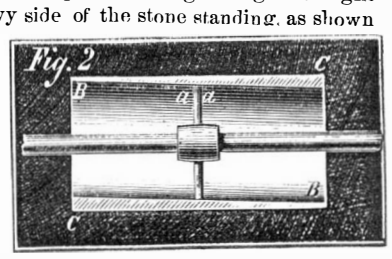
Balancing Cylinders, pulleys, and Runner Millstones.

MESSRS. EDITORS:—I see in the SCIENTIFIC AMERICAN of Sept. 3d, page 148, present volume, W. O. Jacobi and J. G. F., are trying to instruct C. E. M. how to balance his cylinder or shaft and pulleys. But either one of the parties does not give C. E. M. the right plan to balance a cylinder perfectly, although they both have a pretty good idea of the matter. I have had a good deal of experience in balancing machine cylinders and runner millstones.

To balance a pivot millstone true is something very nice to do, and no one that does not understand it will ever get them right unless he does it by accident. No cylinder can ever be balanced perfectly true after being once built and finished, if long. If it is a narrow or thin wheel, it can be balanced true, providing its axles and everything else are done in workmanlike manner. But a long cylinder must be built and balanced all at the same time. For instance: you want to build a cylinder two feet long, with a spindle three feet long, so as to allow bearings on each side, with two heads for staves to be fastened on to form a drum; or it may be longer or shorter, with more or less head. The first thing to be done is to turn up the spindle true just as it ought to be for the purpose intended. Then make the heads, bore, and finish them just as they ought to be. Then have your balancing bars right, and put on the first head you want to go on the spindle, exactly in its proper place, and fasten it then lay the spindle on the balancing bars and balance the head perfectly. Then put on the next head and balance as before, and so on till you get everything on. In this way every head wheel or pulley gets balanced separately. Then I will warrant you this spindle and head will run in balance at any speed. It will be both in running and standing balance. The next thing is, if you want to make a drum of this, to make all the staves just as you want them, all ready to be fastened on the heads, whether iron or wood. If they are to have any attachments like spikes as a thrasher cylinder, the spikes should all be put in, and every thing finished just as they must be. To balance these staves I have two horizontal points, like lathe centers, very fine and sharp, just strong enough to bear the weight of the staves. I then find the middle of the stave lengthwise and the middle sidewise, and insert a scribing awl, if of wood, or a center punch, if of iron. I then put them in the balancing machine, with the points in these holes; one of the points is worked like a lathe, with screw, backwards and forwards to admit the center. By this means I find the heavy and light ends of each stave, then add on to the light end till they balance endwise. I don't care whether they are all of a weight or not after they are all balanced in this way. I fasten them all on cylinder heads as they are to be; I then lay the cylinder on the balancing bars, find the heavy side for standing balance, and whatever it takes to put it in standing balance, I divide it all along on the light side in three or four different parts, from end to end. Then the cylinder will be in running and standing balance. A drum or cylinder built and balanced in this way cannot help running steady.



The pivot millstone is the hardest machine to balance of any, and next in order of difficulty is the wide-cast band pulley, with one set of arms. See the millstone in Fig. 1. If the stone was swinging on the point of the spindle, as shown, and there was a heavy block put in at *a*, the stone would hang down at that point, while standing; but if you should run the stone up to its proper speed, the heavy block at *a* will draw that side up on a line with the cock-head. A millstone left in this way will never grind well, and the most of millers, to remedy this, will put in weight at B, to put the stone in standing balance, which is entirely wrong, it only puts them that much more out of running balance, and helps the heavy block to draw on a line with the cock-head and make the face wabble, the greatest of all faults, sure to produce bad grinding. The right way is to find the heavy side of the stone standing, as shown in the engraving. If it is heavy on one side it is always between the point of cock head and the face of the stone. If the stone is built right and the irons put in the center, I always find what weight it will take to put the stone in standing balance by laying iron at B; then I fasten that much on the stone, at *c*



© 1870 SCIENTIFIC AMERICAN, INC.

about half way between the cock-head and the face of the stone. This puts them in running as well as standing balance, as the standing balance will counterbalance with the heavy block at *a*.

After putting on the iron at *c*, and the stone is in standing balance, or nearly so, I raise the runner by the spindle three quarters of an inch above the bed stone, the back having been previously turned true while grinding the face of the stones together. The driving iron should drive very true at both ends, back and forth. I then run up to grinding speed. I can now see by the eye whether the stone runs true on its face or back; if it seems to run pretty true it is about right, but if it wabbles a little too much I hold a pencil from a rest near the back, and let the high place touch the pencil four or five times; if it touches all on one side I add in a little lead at the point where the pencil touched out against the band and as near the top as is safe to prevent its flying out; and I also put as much more lead on the opposite side down as near the face as it can be put, say, fasten it to the driving band, repeating this till they run true on the face. Then the miller can make good flour with common care.

Such a pulley as is shown in Fig. 2, if it should be cast or made in any other way, bored, and turned up and hung on the shaft, no man could guess where the weight must be put, even to put it in standing balance. At *a a* it might put it more out of running balance; the rim being a little thicker at C C, it would be best to put weight at B B. If the rim is the heaviest at C C, and you would put it in standing balance at *a a*, when the pulley is put in motion, the heaviest parts at C C will throw each end of the spindle up and down in their bearings, and if the spindle is not stiff it will spring and make matters worse. This is the case with all cylinders, after they are made you cannot tell where to put the balance, as materials are sometimes heavier at one place than another, even if they are all of a size. The only way is to balance them as you build them. Anything to run with a high speed ought to be thus made.

Philip Strickler.

Timberville, Va.

On the Use of Tin for Fruit and Culinary Purposes.

Messrs. Editors:—If it would not be regarded as saying more upon the subject than its importance demands, I should like, as a tinner of forty years' experience, to say something upon the tin fruit can and kindred subjects, not so much with a view of allaying apprehension as of stating such facts as are within my knowledge; and first I would remark that tin ware, on account of its lightness, durability, and adaptability to almost all culinary purposes, has driven almost everything else out of every well-ordered kitchen, and if there is any danger to health from its use, this danger is greater in any other article than in the fruit can, because all other articles are exposed to the corroding effects of atmospheric influence, while the fruit can, the moment it is sealed, is secure from the influence. Let me here remark that it is the opinion of some very intelligent persons that the thorough amalgamation of lead with tin, as in the manufacture of solder, neutralizes or renders inoperative the power of the lead, and this view receives considerable weight from the fact that the article so extensively used and highly prized by many of our best housekeepers, known under the name of Britannia ware, which is an alloy of tin and lead, has never been known to injure any one. How little do those housekeepers dream, while regarding with pride their well filled cupboards, that there lurks underneath the beautiful polish a poison deadly as the upas. The new article of manufacture, the tin-lined lead pipe, so confidently recommended as free from all danger, is only so in regard to liquids passing through them. In a well or cistern if the outside is not also protected it will oxidize by contact with the atmosphere, and the agitation or vibration from pumping will cause this poison to fall into the water, whence it will occasionally pass up through the pipe and cause mischief.

Many people have in their composition so much of the timid, the suspicious, and the apprehensive that they undergo an amount of imaginary suffering unknown to those of "sterner mold," and it is curious to witness the contradictory and inconsistent conduct of some of these persons. An acquaintance of mine, for instance, suffers an amount of mental laceration that is affecting to behold, from an apprehension that his store rooms produce an atmosphere unfit for breathing purposes; yet he sees nothing at all unhealthy or injurious in the foul stench of a vile cigar, and will absolutely luxuriate in a cloud of tobacco smoke that would stifle any decent being.

Tin cans for family use should be made of the best charcoal tin, the seams of the body locked rather than soldered, and the tops and bottoms well fitted and soldered on the outside. When emptied of their contents they should be thoroughly scalded and carefully dried, and the caps should be replaced upon them. They should then be put away in as dry a place as possible until they are wanted again. If these precautions are observed, their durability will greatly exceed that of most articles of tin ware now in use.

Delphi, Ind. N. Smith.

Hub Boxes on Railway Cars.

Messrs. Editors:—In your issue of August 20, 1870, I notice an article complaining of hot boxes, and the query, Can the heating of journals be remedied? Please allow me to state what I consider the principal cause on most railroads. Journals and the boxes in which they run are but too often neglected, so long as they run without any apparent trouble. In many shops a pair of wheels will be placed under a car by (often the case) a carpenter of but little railroad experience, and of no practical knowledge of how a brass should be fitted to the journal, and also without knowing for certain that the packing leathers in the back of the boxes fit the shafts and are oil tight. One thing is certain; if good Lightner boxes have good, well-fitted brasses, not Babbitt, done by a skillful machinist, with oil-tight leather washers, and if the centers of shafts in each truck in the train be packed with salt, hay, tallow, and oil, they will run on any road for months without heating, and seldom need oiling. C. Stewart.

Aspinwall.

Rock Asphalte Paving.

Messrs. Editors:—Noticing in your issue of 24th ult. an article from the pen of Dr. Hayes on "Concrete" (or asphalte) paving, I forward an account of the pavement now in well-merited esteem and being largely adopted in the city of London—viz., that of the Val de Travers rock asphalte, which, having proved generally its entire success in Paris, rapidly superseding the plan of macadamizing and stone pitching there, and experimentally tried for the last eighteen months in the former city, has shown clearly its great value, and is now being substituted for the granite pitching for a large portion of Holborn and the entire Cheapside and Poultry, where in either the wear and tear of the traffic exceed that of our busiest streets.

The original asphalte, as adopted by the Continental engineers for paving purposes, was a species of bituminous rock found at Seyssel, on the Rhone, whence its distinctive name, which, however, as we all know, did not prove in every respect satisfactory.

This, however, led to further experiments, and a hard limestone rock was found in the Val de Travers, canton of Neufchatel, Switzerland, containing from twelve to thirteen per cent of bitumen equitably diffused throughout, and consequently allowing a more perfect solving and subsequent hardening process than any of the earlier asphaltes ever could command.

Besides the Val de Travers and the Seyssel there are, strictly speaking, of mines of bituminous materials known, but those of Seyssel Volant, of Auvergne, and of Maestu, near Vittoria (Spain).

The last three are not sufficiently homogeneous in their composition to succeed for paving purposes, while the Seyssel contains but six to eight per cent of bitumen, which is not a sufficient proportion to enable its particles to consolidate quickly and thoroughly under the action of heat and compression. Again, in the Pyrimont Seyssel mine, while the proportion of bitumen is extremely small, the irregularity of its bituminous impregnation, as well as the variety of its associate minerals, rendered its use difficult and unreliable; consequently its endurance was uncertain, and, unless a much more stable material could be adopted, the success of asphalte, once so generally employed by the ancients, was improbable.

Many of the recent compound imitations under the name of asphalte, but consisting of coal tar and such inferior pitch, mixed with lime, chalk, sand, or gravel, have brought into discredit the true material, and it was in the face of great prejudice that the Val de Travers could be even given a fair trial in the crowded streets of England's metropolis. In May, 1869, however, 485 square yards of the Val de Travers compressed asphalte was laid in Threadneedle street, over which passes a traffic of 2,500 vehicles daily. A year and a half afterwards no perceptible wear could be observed, while openings purposely cut in its surface and repaired within fifty minutes were barely visible, and as perfect as the original bed.

The result has been that over 1,000 of the leading firms, banks, and companies, petitioned for its extension on all the city streets, urging that its "freedom from the roar of traffic, and its cleanliness, safety, facility of construction and repair, and less cost, as compared with granite, wood, iron, or any known variety of paving, rendered the desirability of extending its use throughout the city as imperative." And the report of the street committee indorsing the Val de Travers asphalte on all these points, the change is being already effected.

The term "compressed" asphalte is used to distinguish it from those asphaltes where the material is boiled to a liquid, which this is not, being spread upon the surface in the form of a fine powder, and never liquefied.

In its use for paving the natural rock is first ground to a powder and subjected to an intense heat in a revolving boiler near the place of use, then taken and spread over the prepared surface to a depth of but two inches, and compressed with heated irons into a homogeneous mass without joints and entirely impervious to moisture.

As it cools it hardens to the original density of the rock, and for my own satisfaction I tested the fact that in less than one hour from the spreading of the powdered material the vehicles were traversing its surface without causing injury or impression.

The foundation used is Portland cement concrete, say eight inches thick, on which half an inch of thin mastic is run to economize the asphalte, which is then spread and leveled.

The advantages claimed for the Val de Travers are sevenfold:

1. It produces neither dust nor mud.
2. It is perfectly noiseless.
3. It diminishes, by a large percentage, the draft on horses.
4. It reduces the wear and tear of vehicles to one half, the annual saving in Paris being computed at over three million dollars for horses and carriages.
5. It increases the comfort and rapidity of travel.
6. Its economy and durability.
7. It is unaffected by heat or by frost.

In addition to its uses for paving it is in much demand for terraces, conservatories, slaughter houses, court-yards, breweries, fire-proof floors, docks, fortifications, powder magazines, etc.

Now, if this wonderfully valuable material can be readily shipped to England, why not to this country, or, if the increased freight, exchange, etc., render it too expensive for our use, let our numerous inventors follow out the suggestions of Dr. Hayes, which are surely based on correct grounds, and with bitumen, chemically combined with calcareous earths, devise a compact, artificial asphalte, unaffected by alternations of heat or cold, which, hardening readily, shall, by its semi-elasticity, tenacity, and cheapness of production, prove its advantages, reap a fortune for its discoverer, and earn the blessings of all unborn citizens.

New York city. Geo. E. Harding.

Inventors who are Satisfied.

Freeport, Ill., Sept. 21, 1870.

Messrs. Munn & Co.:—I thank you for reminding me of the extension of my patents, but I cannot take the oath necessary, believing I have received a reasonable compensation on all my patents, and have sold out my reaper establishment; but I find exercise absolutely as necessary for me as food, and therefore fancy farming, or rather vinyarding, which has not as yet been very successful in this country. I find in it ample exercise and study for the mind in trying to solve the mystery. In trying all sorts of experiments, I may perhaps hit on something useful. It is a very pleasant occupation at all events. Yours, etc., P. Manny.

Riggsville, Pa., Sept. 22, 1870.

Messrs. Munn & Co.:—I take much pleasure in informing you that I have received my letters patent, all in good order, and I am a thousand times obliged to you for your honest, upright, and careful attention to my business. I praise the bridge that carries me safe over. I would sooner pay your fees all down, without a receipt, than to trust my business in other hands. I shall recommend your Agency and paper without your request, for I think it my duty to do so.

Jas. K. B. Solomon.

Chester, Pa., Sept. 15, 1870.

Messrs. Munn & Co.:—Please accept my thanks for the very efficient manner in which you have transacted the business intrusted to you, namely, procuring patent for steam piston packing. If my experiments prove successful, I will require your assistance again.

Respectfully, John Keesey.

DESIGN PATENTS.

DECISION BY JUDGE BLATCHFORD.

The bearing and scope of design patents have, in a recent suit of the Gorham Manufacturing Company *vs.* George C. White, selling agent of Rogers & Bro., for the infringement of a design patent, been more clearly defined than on any previous occasion.

The letters patent in question cover the invention of a design for a spoon and fork handle, not only as far as the configuration or mere outline, or the ornamentation on the face of the same is concerned, but as a "unit," which was in this case construed to be the combination of configuration and ornamentation.

The defendant has sold spoons and forks whose handles were, in outline, more or less similar to, but in ornamentation entirely different from the design represented in complainant's patent. And although the complainants sought to prove by witnesses that the respective articles or designs resembled each other in *general* appearance, such testimony was held to be ineffective, as long as persons in the trade will not be deceived by the resemblance into taking an article of the one design for an article of the other. The letters patent in question, covering, by the claim, the design as represented, were held to protect, not the result or appearance of such design, but the *means* of producing the result or appearance, so that even if the same appearance is produced by another design, if the means used to produce it are different from the means used in the prior patented design to produce such appearance, the latter design is not an infringement of the patented one. The suit was consequently dismissed.

The chief point settled by this decision, is that design patents must be construed, as to their scope, in the same manner as mechanical patents—that is to say, if a patented design consists of a new addition to an old form, and is so claimed, the patent will cover the addition only, and not its connection with the old form; if the design, however, is patented as a *unity*, it is for a *combination* of *all of* its parts, and any other person may use any of its parts, less than the whole, and not be an infringer.

The same rule, as applied to the matter of infringements will, of necessity be and has in fact always been, a guide to the Commissioner of Patents in determining the question of interference between different designs. He examines not the effect produced by a design, but the means used for producing the same, and if the means employed to the same end differ, they entitle each applicant to a patent, provided that the stated novelty is not disproved.

A Kansas Silk Factory.—According to the Detroit *Tribune*, the first velvet factory in the United States has been started by a French colony in Kansas, at the town of Franklin, eighteen miles southwest of Ottawa. The colony began operations last summer on the co-operative plan, and have already, besides their manufactory, comfortable dwellings, stores, and shops, and farms under full cultivation. The pioneer in this enterprise, M. Veleton de Boissiere, contemplates supplying his community with other looms, not only to increase the manufacture of ribbons, but also to enlarge the products of his community by including sewing silks, tassels, trimmings, and other dress materials, which are fast becoming indispensable even beyond the Mississippi.

© 1870 SCIENTIFIC AMERICAN, INC.

HOW RAILROADS ARE MADE.

BY JACOB ABBOTT.

THE CHARTER.

When the grant is obtained from the Legislature, it is inscribed in a very distinct and legible manner upon parchment, and authenticated by the proper signatures and seals, and is delivered to the Company. Such a document as this is called a Charter.

THE COURSE OF THE ROAD.

The general course of the road is usually prescribed in the charter. The precise line, however, cannot be determined without much careful study and examination, and many accurate surveys. There are a great many different considerations which have to be taken into the account in deciding the question. If the only thing to be inquired into was the conformation of the land on the different possible routes, with a view to determining on which of them the track could be laid most easily, with the gentlest inclines, and the least expense for bridges, culverts, and the like, the question would be very simple. But there are many social and business considerations to be regarded—such as the position of towns in the neighborhood of the line—not only of those already existing, but of those which may be brought into existence in in consequence of the road; the points where freight of different kinds, and passengers from the surrounding country, may most exsily be concentrated; the facilities for the construction of stations; and other similar points.

Sometimes, indeed, it is found, after making a careful calculation, that it is better to go through a hill by means of a tunnel, rather than to make a circuit to avoid it. The calculation, in this case, is very complicated, involving, as it does, a great number and variety of considerations—such as the nature of the formation; whether consisting of solid rock or of beds of sand or gravel, which is to be cut through, or of loose and friable strata of any kind, requiring an arch of masonry to sustain the roof, as seen in some tunnels; the saving of fuel and of time in the subsequent working of the line by going straight, and on a level, instead of pursuing a devious course up and down inclines; and, finally, the advantage of not disturbing the public roads on the surface, or the private property which would have to be paid for,and of avoiding the necessity of building bridges or culverts which might be required on any feasible route that would avoid the hill.

In the same manner, a complicated calculation has to be made, to determine whether it is best to shorten a distance by constructing an expensive work for carrying the line across a river, a marsh, or a pond, or to avoid the obstacle by a circuit and save that money.

All these things, which have to be taken into the account in the calculations which the directors have to make, would seem to render the case complicated enough,but the difficulty and embarrassment are vastly increased by the number and variety of conflicting interests which are brought into action. These interests are, of course,much more important,and much more serious, in the pressure which they bring upon the directors in the old and more densely populated countries in Europe, where land is much more valuable, and towns more numerous, where rich estates, costly gardens, and elegantly ornamented pleasure grounds are more frequent, and more highly valued than with us. One line of towns competes with another, each wishing to have the road pass through them. One nobleman, or great landed proprietor contends against another, each wishing to keep the road away from his parks or gardens. The baron trembles for his castle, for fear that the road will cut through the grounds of it. The farmers adjoining him tremble lest the road should not come that way, and so deprive them of the opportunity of sending their produce conveniently to market; and different manufacturers, who cannot all be accommodated, severally urge the directors to run the line here, there, or in the other place, each wishing to secure facilities for himself in bringing materials to their establishments, and taking away the manufactured goods.

All these things the directors have to consider before they can decide upon the location of the line; and a very perplexing and embarrassing work they often find it.

GENERAL SURVEY.

The principal towns through which it is finally decided that the line shall pass, form usually fixed points for the track, both in respect to position and level, so that the construction of the line going from one town to another,becomes, as it were, in some respects, a distinct and independent work. Of course, the best determination of the track, were it practicable, would be in a direct line from one terminus to the other, and a uniform incline, in case of any difference of level. But this is seldom possible. The track must rise and fall, to follow gentle but extended undulations in the land, and deviate to the right or to the left, to avoid all high hills and deep valleys,and sometimes to avoid exceptionally valuable estates, the traversing of which would involve too great an expense for damages. To enable the directors to judge intelligently on these points, a careful survey of the country must often be made, and accurate maps and profiles constructed, showing not only the natural scenery,such as the course of the streams, the positions of the villages, the situations of forests,marshes, ledges of rocks, and other such characteristics, but also the differences and the exact gradations of level in every part.

TRIANGULATION.

All surveys of land for such purposes as this are made by a very curious process called triangulation. Very few persons—except those who have had their attention particularly called to the subject—have any distinct idea of the nature of this process; and yet, after all, it is very simple in principle, though very curious, and is very easily understood.

The method consists in dividing the whole territory of the country to be surveyed, into triangular areas, by means of signal posts, set up at proper intervals on the summits of hills, or on any commanding positions, and connecting these stations by imaginary lines. These lines are so drawn, however, and so connected at the points where they meet at the stations, that each side of every triangle forms, also, a side of the triangle next to it. In other words, the triangles are formed by sets of lines radiating from the same points—namely, the signal posts on the eminences above mentioned.

The reason why the triangle is employed for this purpose in preference to any other figure, is, because it is so much more easy to be measured with accuracy than any other; and the reason why it is so much more easy to be measured, is, because the work may be done chiefly by the measurement of angles; and angles may be measured much more easily and accurately, on a great scale, than lines.

DIFFERENCE OF BEARING.

The angle formed by two lines running from any station on a hill or mountain,to objects in the field of view, is simply the difference of bearing of those objects. Now, if an observer stands at a signal post on a mountain, and sees the spires of two villages at a distance across the country, he can measure the exact bearing of each of the spires from the place where he stands, and can obtain thus the difference of direction of the two lines running toward them, very easily, and with great precision, by means of extremely accurate instruments constructed for the purpose; and could do it, moreover, in a moment, without leaving the spot where he stands. On the other hand, to measure the distance of one of the spires by means of a rod or chain applied to the ground, would require him to scramble down the sides of the mountain, over rocks and precipices, and to traverse the intervening country, through forests and bogs, perhaps, and over all sorts of impediments. The work would be, in all cases, one of great difficulty; in many cases it would be impossible, and without the expenditure of great labor and expense in the mode of performing the operation, there could be no reliance whatever in the accuracy of the result.

This is the reason why it is so much easier, in surveying, to measure angles than lines.

Still, it is not possible, wholly, to dispense with the measurement of lines on the earth's surface, in surveying. There must be one line measured for every survey as a means of beginning the calculation. One line being thus measured by mechanical means,and made one of the sides of the first triangle, the other sides of the first triangle, and all the sides of all the other triangles, can be obtained by calculation from the measurement of angles alone.

THEORY OF THE CALCULATION.

A glimpse of certain mathematical properties of the triangle, on which these calculations are based, may be obtained by means of the supposition that two huntsmen, standing at a certain distance from each other, are aiming at the same mark. Each one is pointing his gun in a certain direction—that is, so that it forms a certain angle with the line we may imagine to be drawn between them. Now, it is plain that if the mark is moved from its position in any way—whether it is carried farther off or brought nearer, or moved to the right or to the left—one or both of the huntsmen would have to alter his aim.

In the same manner, if the distance between the huntsmen is increased or diminished, while the position of the mark remains unchanged, then, too, the aim must be changed.

In other words, it is plain that all the dimensions of the triangle are controlled, or, as the mathematicians express it, determined, by the length of one side, and the bearings from it of the other two sides; in other words, by one side and the adjoining angles.

PRACTICAL SOLUTION.

This principle, so obviously true, may be reduced to practice by a very simple method. We have only to draw a triangle upon paper of the same proportions and form with the one on the field, and then measure the two unknown sides by the same scale that was used in laying down the known side. For instance: suppose that the distance from one huntsman to the other was found to be sixty paces. We conclude to take for the scale a tenth of an inch to a pace, which would give sixty tenths of an inch, or six inches for the length of the corresponding line upon the paper. Then, from the two extremities of this base line, we draw two other lines at the same angles of inclination with it as were made by the lines of aim of the two guns, and then prolong these lines until they meet.

We shall now obviously have upon the paper a triangle of the same form and proportions with the one imagined in the field, and we have only to measure the two lines converging toward the mark by the same scale to which the first line was drawn—namely, one tenth of an inch to a pace, to ascertain the distance in paces from the station of each huntsman to the mark

INACCURACY.

It is plain that the principle of this operation is perfectly correct in theory, but the imperfections in the methods of measurement, as described above, would render the result quite uncertain as to accuracy. Pacing gives only a very rough approximation to the actual length of any distance on land. The terminations of the line, too, at the point where the huntsmen stand, are very indefinite; and then the huntsmen cannot be supposed to have any other than very imperfect means of estimating the bearing of their respective lines of aim, in relation to the base line between them. The drawing of the triangle on the paper to a scale, would admit of a greater accuracy than any other part of such an operation; but even this could not be performed with a degree of precision that would satisfy the ideas of a skilled mathematical surveyor.

ACCURACY.

The example given above is only intended to afford some general idea of the principle that certain parts of a triangle determine, necessarily, the other parts, so that, if the former are ascertained by measurement, the latter can be ascertained by calculation. The surveyors have the means of determining the lengths of lines measured on the earth's surface, and the magnitudes of the angles formed by the bearings of different signals from the same point, with a precision almost inconceivable. It would, however, be out of place to describe those instruments or methods here.

Then, moreover, they depend for their results, not on drawings made mechanically on paper, but on mathematical calculations made by the help of trigonometrical tables, constructed with infinite labor and study. Still, although the processes necessary to secure exactness in the results are laborious and complicated, the principle on which the work is based stands out in all its simplicity in the midst of it—namely, this, that

"If two lines converge toward each other at the ends of a third line, the length of which is known, the amount of the convergence, as measured by the angles, will determine the distance at which they will meet."—*Riverside Magazine.*

Fire-Proof Construction.

On the 11th of last month the Drake, Farwell & Thatcher block, Chicago, one of the most beautiful and costly business structures ever erected in this country, was burned to the ground. Several lives were lost, and the total amount of property destroyed is estimated to have been two and one half millions of dollars. The building was designed by and erected under the supervision of Mr. John M. Van Osdel, a most highly accomplished and skillful architect, and, while not intended to be fire-proof, it was supposed to be among the most substantial structures of its class.

In writing of its destruction at this late date we do not purpose to enter into detail, because the catastrophe was but a repetition of similar disasters which have occurred in this and other cities. In every essential particular the structure, on the morning before the fire, would not have suffered by comparison with buildings of its class in any city in America. The walls were equally heavy, and a careful examination of the ruins afforded convincing evidence that the masonry had been executed with scrupulous care. The Mansard roof, about which so much has been said contained less wood than the majority of similar roofs in New York, Philadelphia, and Chicago. According to the American idea it was a first-class building. It was as good as any building of similar size not intended to be fire-proof. And now, after all this, if it can be proved that the walls were of insufficient thickness, that the roof was of material too inflammable, that the system of anchoring joists was bad, what does it all signify? It simply signifies a condition of things which the *Builder* has from the beginning denounced. We have said, again and again, that our entire system of building needs reforming. If not, then why are we compelled to witness these fearful conflagrations? Why do we not hear of such fires in the great cities of the old world? Do we ever read of a fire like this in Paris? No: the elder civilization builds better than we; and, building better; it builds cheaper. The expense of iron girders is not a serious matter in the construction of a building which is to contain millions of dollars, worth of merchandise in its several departments, because it is not difficult to construct fire-proof floors after the French method where no wooden joists enter the walls. Our underwriters clamor for thicker walls.

We have been referred, time and again, to the recent fire on Randolph street, where the walls are standing; but those walls were built under Mr. Van Osdel's direction, and differ little, if any, from other walls. The fire went through them in twenty different places, and all that saved the adjacent building from burning was the Babcock extinguisher in the hands of the firemen and citizens, prominent among whom was Mr. Murphey, secretary of the Home Insurance Co.

It is hardly fair to charge all the evils of the present system of building on the architects, because the evil is back of them. Property owners demand a liberal percentage on their investments, and in order to secure it buildings must be erected with special view to cheapness. When the *Tribune* Company desired a building that would not burn down, there was no difficulty in finding an architect to execute its will. The greed manifested by property owners to secure the largest percentage possible on rentals, and the extreme willingness of insurance companies to make good all losses, are the saddest features of this whole building business.

ELASTIC AND SWEET GLUE.—Good common glue is dissolved in water, on the water bath, and the water evaporated down to a mass of thick consistence, to which a quantity of glycerin, equal in weight to the glue, is added, after which the heating is continued until all the water has been driven off, when the mass is poured out into molds, or on a marble slab. This mixture answers for stamps, printers' rollers, galvano-plastic copies, etc. The sweet glue, for ready use by moistening with the tongue, is made in the same way, substituting, however, the same quantity of powdered sugar for the glycerin.

WHATEVER be the issue of the struggle between France and Germany, Von Moltke has won his place in history. The student of European warfare can no more think of 1866 or 1870 without having in mind a picture of that small, thin, silent old man, than he could think of Silesia and forget Frederick the Great, or Austerlitz and not remember Napoleon

© 1870 SCIENTIFIC AMERICAN, INC.

Improvement in Woodworth's Surface Planer.

The accompanying engraving shows a very neat and compact machine for planing wood surfaces, being a modification of the well-known and justly popular Woodworth planer. It is, in fact, a consolidated Woodworth planer with four rolls above and two below, with a narrow table under the knife, and having the rolls all geared together. The compactness of this arrangement, and the economy of space and cost secured thereby, will be apparent upon inspection of the engraving.

N, in the engraving, represents the cylinder knives on the shaft with main-pulley and feed-pulley. E is one of the front feed rolls, four inches in diameter. The other front feed roll is three inches in diameter, but is hidden by the roll, E.

The position of the back rolls, which are precisely like those in front, except that they are not fluted, is indicated by the letter W. Caps, G, contain compression rubber springs which serve to hold the rolls in place, yet to allow them to accommodate themselves to varying thickness of stuff.

L is one of the under rolls four inches in diameter. A similar one is on the back side of the machine, not shown in the engraving.

A represents the feed shaft and pulleys, D is a clutch coupling with lever for running the working parts of the machine into gear with the shaft, A. The cone pulley next the clutch lever forms a part of the clutch coupling, and runs loose on the shaft when not clutched. The feed is regulated by the cone pulley, M.

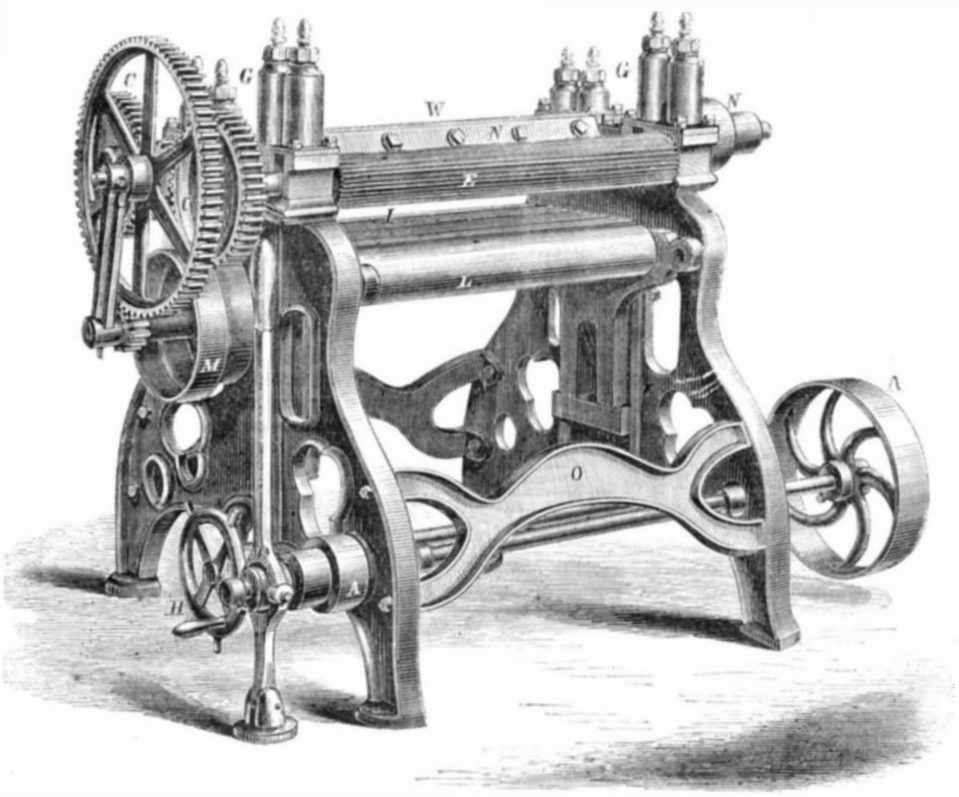
C is the gearing which drives the feed rolls.

The table, I, is raised or lowered by the hand wheel, H, which acts through bevel gearing, not shown, to turn vertical screws playing in nuts fastened to the bottom of the table.

The sides of the frame are massive and strong, and are firmly connected by the heavy brace pieces, O.

A hood, not shown in the engraving, serves to throw off shavings. It is so constructed as to rise and fall with the feed-rolls, and to completely cover the back smooth rolls, so that no shavings can get on either these rolls or on the board, to mar the latter after it has been planed. This attachment is regarded as a great improvement.

For further particulars, address the New England Machine Co., Fitchburg, Mass.



IMPROVED WOODWORTH SURFACE PLANER.

Pekin as It Is.

A correspondent of the Sacramento *Union*, writing from China, thus describes Pekin:

No long description, be assured—only this: From the observatory one sees a large portion of the town. Built of mud-brick, and gray stone, dotted with sparse foliage, of magnificent distances, curious architecture glimmering in the light, serpentine lanes and by-ways, the scene is not enchanting. In the streets, the scenes to be encountered are revolting. Sand, filth, pools of fetid water, miserable mud huts, and occasional tawdry temples; innumerable braying donkeys; such carts; dromedaries; occasional chairs; long lines of mules; dense throngs of coolies, of whom not one in twenty—aye, fifty—is half-clad in dirty rags; crawling beggars festering with disease; among the people scenes of gross indecency on the very sidewalks—a perfect disregard for what even a "Digger's" modest would revolt at; women, Tartars, small merchants, peregrinating restaurants, naked children eight or ten years of age; shops filled with earthenware of coarse manufacture; tea houses about every mile; the habitation of some high Chinese officials—one-storied, and that would make a second-rate stable in America; half-a-dozen temples, once massive and costly, but with no trace of beauty; the principal street, paved with rough blocks of granite that is worn in deep ruts and almost impassable; the emperor's palace and grounds—a dingy, barren walled inclosure, guarded by slaves; streets almost impassable with rubbish, ruts, and rocks; in brief, the most wretched, decayed, crumbling, repulsive spot we ever saw, with a semi-civilized, conceited, inhospitable, lazy, lousy populace, with no trace of anything that tells of content or happiness equal to their associates and superiors—the dogs and pigs of the Imperial capital.

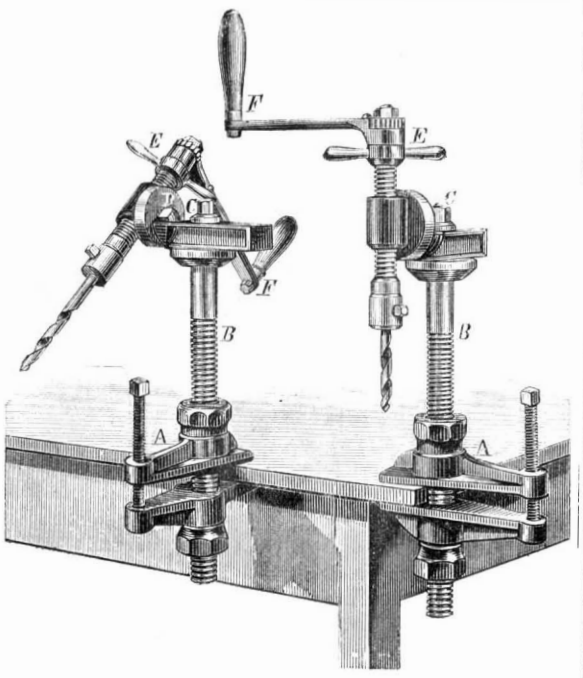
This is Pekin, with its millions of wretched inhabitants. I confess to unmitigated disgust. I abhor those enthusiastic chroniclers who have shed untruthful ink in praise of this horrible place. If proof is required to substantiate my views, I would refer to an esteemed resident of Sacramento, now a thoroughly disgusted resident of Pekin.

The Love of the Beautiful.

What are half the crimes in the world committed for? What brings into action the best virtues? The desire of possessing. Of possessing what?—not mere money, but every species of the beautiful which money can purchase. A man lies hid in a little, dirty, smoky room for twenty years of his life, and sums up as many columns of figures as would reach half round the earth, if they were laid at length; he gets rich; what does he do with his riches? He buys a large, well-proportioned house; in the arrangement of his furniture he gratifies himself with all the beauties which splendid colors, regular figures, and smooth surfaces can convey; he has the beauties of variety of association in his grounds; the cup out of which he drinks his tea is adorned with beautiful figures; the chair in which he sits is covered with smooth, shining leather; his table-cloth is of the most beautiful damask; mirrors reflect the light from every quarter of the room; pictures of the best masters feed his eyes with all the beauties of imitation. A million of human creatures are employed in this country in ministering to this feeling of the beautiful. It is only a barbarous, ignorant people that can ever be occupied by the necessities of life alone. If to eat, and to drink, and to be warm, were the only passions of our minds, we should all be what the lowest of us all are at this day. The love of the beautiful calls man to fresh exertions, and awakens him to a more noble life; and the glory of it is, that as painters imitate, and poets sing, and statuaries carve, and architects rear up the gorgeous trophies of their skill—as everything becomes beautiful, and orderly, and magnificent—the activity of the mind rises to still greater and to better objects.

IMPROVED HAND-DRILLING MACHINE.

The convenience of a hand-drilling machine that can be easily and quickly set to drill at any desired angle, and which combines with this attainment the conveniences of the ratchet drill will be appreciated by every machinist. The hand-drilling machine herewith illustrated combines the advantages named, and is a very neat, light, and useful machine,



extremely simple, yet capable of a great many applications in practical use, which we need not specify, as they will at once suggest themselves to all practical men.

A clamping vise, A, serves to sustain the screw post, B, in any required position on the bench, or upon the framework or other portion of machines where it may be requisite to use the drill for special service. Strong nuts receive the screw-post, B, and acting against each other, hold the screw-post firmly after it is adjusted to the proper hight from the bench.

A horizontal arm is pivoted to the top of the screw-post, and may be turned radially about the axis of B to any desired position, and then secured by turning down the nut, C.

To the end of the horizontal arm is pivoted a plate which carries the drill and feed screw. The latter may be turned radially about the axis of the horizontal arm to any required position and secured there by turning home the nut, D. The feed-screw is actuated by the lever nut, E, in the usual manner.

A winch, F, operates a ratchet and pawl on the arbor of the drill, so that it may be revolved entirely around or through any arc of its revolution in cramped positions where entire revolutions are not practicable.

It will be seen that within certain limits, depending upon the size of the machine, there is not a point to which the drill cannot be set and made to operate with ease and facility

Patented, through the Scientific American Patent Agency, April 5, 1870, by James E. Hunter. Address, for rights, machines, or other information, James Hunter & Son, North Adams, Mass., or Kelly, Howell & Ludwig, agents, 917 Market street, Philadelphia, Pa.

A Chicago Street Locomotive.

Mr. D. J. Lake, who was the contractor for constructing the lake tunnel, has invented and constructed a peculiar road engine, which has been tried of late in our streets. It has the apparatus of a steam fire-engine attached. The following description we copy from the Chica. *Times*:

"In an ordinary locomotive, the steam from the cylinder acts upon the piston and is communicated directly to the crank of the driving wheels. In Mr. Lake's machine, when desirable, the motion can first be communicated to balance wheels. When these wheels have reached a very high rate of speed, the power can be communicated by a 'clutch' to the driving wheels. The communication can be made gradually, or as rapidly as may be thought desirable.

Any one can see the benefit of this style of communication. Suppose the vehicle in a place where it requires extra force to start it. By applying the power at once no movement is effected; but by storing it up in the balance wheels, and then communicating it to the drivers, one gets almost precisely the same benefit that he would by getting, say, a heavy wagon under rapid motion just before running it up an incline.

"He has another novelty. The machine has two sets of driving-wheels, one of which is considerably smaller than the other. By a simple use of the screw, either set can be raised, leaving the other on the ground. The power can be applied at will to either. The object of these two sets is, of course, to obtain either greater power or speed, as may be desired. In hauling heavy loads, the small wheels will be used, and in excursions, where there is no great weight to be hauled, rapidity is secured by the employment of the large drivers.

"A pump and air-chamber furnish a complete apparatus for throwing water; while a hand wheel allows the transfer of power to a thrashing machine, or any other article of the kind.

"The engine itself is a very handsome one. It weighs about three tuns, and moves without difficulty, and guides as easily as a well-trained horse."

Patented through the Scientific American Agency.

HISTORY OF CHLOROFORM.

The story of the discovery of the properties of chloroform in England is this: A Mr. Waldie, a chemist and bookseller at Linlithgow, had one day some of the liquid in a saucer, when a gentleman entered the shop with a little dog. The chloroform was placed on the ground to be out of the way, and presently the dog was discovered lying by the side of the saucer, unconscious, and apparently dead. After a time, however, while the stranger was mourning over the loss of his pet, the dog moved his limbs and gradually regained consciousness. Mr. Waldie began to think that he had made a discovery, and, after having administered chloroform to a number of cats with the same result, was confirmed in his belief. He went to Edinburgh to relate his story to some medical men, and at the suggestion of a friend, called upon Professor James Y. Simpson. After that interview Simpson tried a number of experiments, and proved beyond all question the virtues of chloroform as an anæsthetic. Professor Simpson published the results of his experiments in 1847, and gave full credit to Mr. Waldie for his share in the matter; but, as the learned physician had previously tried ether, protoxide of nitrogen, and everything in fact that was suspected to have anæsthetic properties, it is more than probable that he would soon have hit upon chloroform.

It was Dr. Simpson who first applied chloroform in childbirth, and for this he is justly celebrated. Although chloroform was discovered by an American, Guthrie, in 1831, and the editor of the *Pharmaceutical Journal* of Philadelphia, in publishing an account of it, even at that early date, anticipated for it an extensive application in medicine, it was not until the news of Dr. Simpson's experiments reached this country in the winter of 1847, that this valuable compound was introduced as an anæsthetic. The scientific properties of chloroform were first investigated by Liebig and Dumas, and they gave it its present name from its supposed chemical constitution—terchloride of formyle, which was abbreviated to chloroform.

Linen can be glazed by adding a teaspoonful of salt and one of finely scraped white soap into a pint of starch.

© 1870 SCIENTIFIC AMERICAN, INC.

Scientific American,

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

C. D. MUNN. S. H. WALES. A. E. BEACH.

☞ "The American News Company," Agents, 121 Nassau street, New York.
☞ "The New York News Company," 8 Spruce street, New York.
☞ Messrs. Sampson, Low, Son & Marston, Crown Building, 188 Fleet st. Trubner & Co., 60 Paternoster Row, and Gordon & Gotch, 121 Holborn Hill, London, are the Agents to receive European subscriptions. Orders sent to them will be promptly attended to.

VOL. XXIII., No. 16 . . [NEW SERIES.] . . *Twenty-fifth Year.*

NEW YORK, SATURDAY, OCTOBER 15, 1870.

Contents:

(Illustrated articles are marked with an asterisk.)

*Improved Stump Extractor.....238
Kid Gloves.....239
The "Instrumen Room" of the Electrical Telegraph of London.....239
Inagural Address of the President, Thos. H. Huxley, LL.D., F.R.S., etc., before the British Association for the Advancement of Science.....24
Culture and Art.....241
*New Capital for the State of New York.....242
Log Dams.....242
Henry Ward Beecher on Interest.....242
*Improved Spring Bed.....243
The Manufacture of Portland Cement.....243
Balancing Cylinders, Pulleys, and Runner Millston s.....243
On the use of Tin for Fruit and Culinary purposes.....244
Hub boxes on Railway Cars.....244
Rock Asphalte Paving.....244
Inventors who are satisfied.....244
Design Patents.....244
A Kansas Silk Factory.....244
How Railroads are made.....245
Fire-proof construction.....245
Elastic and Sweet Glue.....245
*Improvement in Woodworth's Surface Planers.....246
*Improved Hand-Drilling Machine.....246
Pekin as it is.....246
A Chicago Street Locomotive.....246
History of Chloroform.....246
Central Park—Report of the Commissioners.....247
Woodbury's Photo-relief Process.....247
The Gatling Battery Gun in England.....247
Comparative Accuracy of Mercurial and Aneroid Barometers.....248
The Fair of the American Institute.....248
What a contra t.....248
Trial of the U. S. Chemical Fire Engine.....248
Its pays to Advertise.....248
The Giant Coupling.....249
Letter from the South.....249
Immigration.....249
Fair of the Central Agricultural and Mechanical Association Selma, Ala.....249
Trial of the Aveling and Porter Steam Road Roller at Orange, N. J.....249
Trade-Mark Decisions.....249
Surveys of the Isthmus of Darien.....249
Answers to Correspondents.....250
Recent American and Foreign Patents.....250
List of Patents.....251
Applications for the Extension of Patents.....252

To Advertisers.

The circulation of the SCIENTIFIC AMERICAN is from 25,000 to 30,000 copies per week larger than any other journal of the same class in the world. Indeed, there are but few papers whose weekly circulation equals that of the SCIENTIFIC AMERICAN, which establishes the fact now generally well known, that this journal is one of the very best advertising mediums of the country.

To Inventors.

For twenty-five years the proprietors of this journal have occupied the leading position of Solicitors of American and Europ ean Patents. Inventors who contemplate taking out patents should send for the new Pamphlet of Patent Law and Instructions, for 1870.

CENTRAL PARK, NEW YORK---REPORT OF THE COMMISSIONERS.

The report of the Central Park Commissioners for 1869 has but just made its appearance. We are, however, compensated for the delay by the fullness of the report. The book, which is in pamphlet form, comprises some two hundred pages of valuable statistics, and other matter, and is illustrated with a number of photographs and lithographs. The lithographs illustrate the work of Professor Hawkins, who has been, as our readers are already informed, engaged in modeling a group of fossil animals for the Museum, and the meterological instruments, improved and invented by Mr. Daniel Draper, and used in his observations, are given at length for the year in the report. The photographs are chiefly scenes and statuary in and about the Park.

From the body of the report we are enabled to extract some items of general interest.

THE MUSEUM.

As a beginning of this collection, intended to ultimately be made equal to any in the world, the Commissioners have purchased

1st. The entire collection of the late Prince Maximilian, known as the Weid Collection, comprising 4,000 mounted birds, 600 mounted mammals, 2,000 fishes and reptiles.

2d. Selections from the Verreau collection at Paris, 2,800 mounted birds, 230 mounted mammals, 400 skeletons.

3d. The entire collection of American and foreign birds, about 2,500 in number, lately belonging to D. F. Elliott, Esq.

4th. A series of 250 birds of Siberia, purchased from Monseiur Vedray, in Paris.

This purchase, comprehending in all 12,770 specimens, as follows: Mounted birds, 9,550; mounted mammals, 820; fishes and reptiles, 2,000; skeletons, 400.

The details of the conditions upon which these collections are to be deposited with the Park Commissioners have not yet been entirely settled, but it is believed they will be such as to be satisfactory to all the parties concerned, and greatly to the public advantage. It is important that the conditions be carefully devised, to provide for all probable contingencies, to protect the property, to keep alive and extend the interest of the donors, and to serve as a precedent for those interested in other branches of art and science who may be disposed to make like arrangements.

Prof. B. Waterhouse Hawkins has been engaged in advancing the group of fossil animals, more fully alluded to in the last Annual Report. A very wide interest, both in this country and in Europe, has been excited among scientific men by this interesting and novel undertaking. The proceedings of the Commissioners of the Park in this matter have been alluded to, commented upon, and commended by scientific journals, both at home and abroad.

It would be difficult to insure too great care in the preservation of the wonderful remains of animal organizations of past times that are from time to time discovered in different parts of the country. There are examples of fossil remains lying in public and private collections of the country, that in the interest of science, should be utilized and placed where they can readily be got at by those especially interested in this department of inquiry. It is very difficult, except through the offer of a reward in money, to impress upon those who, in excavation, casually come upon fossil remains, the importance of handling them with care; they are often, to them, nothing but old bones, and a stroke of the pick, or a scoop of the shovel may, in an instant, irrevocably destroy or cast away a fragment that might serve to establish or refute received ideas of the past eras of our globe.

The great group of ancient animals formerly living during the secondary geological epoch on the continent of America, now being modeled and restored to the natural size and appearance of the animal as in life, by Mr. Hawkins, for the Central Park, consists of the gigantic Hadrosaurus of the exact dimensions (one twenty-six feet, and the other thirty-nine feet long), as proved by the fossils described by Dr. Joseph Leidy, in the "Smithsonian Contributions to Knowledge, No. 192"; also models of "Laelap's Aquilunguis" fossils, described by Cope, together with the aquatic "*Elasmosaurus* and *Mosasaurus*." The second division of the group will illustrate the post-tertiary period, and represents the mastodon, the mammoth, megatherium, megalonyx, glyptodon, etc., etc., thus uniting the early periods of animal life with the earliest evidence of man's existence, and so constituting a complete visual history of the American continent from the dawn of creation to the present time.

THE ZOOLOGICAL GARDENS.

The progress reported in the zoological gardens has not been great, owing to want of proper drainage, insufficient housing for animals, and delay in regulation of streets and avenues about the grounds. It will probably be a year before this feature of the Park reaches completion. The commissioners having no control over the difficulties specified are obliged to wait the movements of others. They report, however, that

Nearly two thirds of the foundation wall is, on the west line of the square, complete. The preparatory excavations of the habitations of the large group of northern carnivora represented by the genus *Ursus*, or the bears, with their allied genera, has been made at the southwest angle of the Zoological grounds. At this point are also commenced the accommodations for the polar bears, the walrus, seals, sea lions, etc., specimens of cetacious, and also for the aquatic rodents, such as capybare, beaver, etc. In these, as in all other habitations for the animals of the gardens, every arrangement that will conduce to their healthfulness, and to the facility and convenience of observing them, will be provided, and it is hoped that in the outset the knowledge of the needs of various classes of animals may be so thorough, and the skill in utilizing this knowledge for the purposes required may be so marked and successful, as to avoid much of the expensive alterations and changes in plan that have characterized, during the last half century, the experiences of most of the European gardens, and that by the time these habitations are ready for occupancy, some of the ways of approach to the gardens may be passable. Some progress has also been made in the preparation of designs and models for the houses of tropical carnivora, and each class of animals, in the order of its relative importance, will be located and properly housed and provided for.

METEOROLOGICAL OBSERVATORY.

This employs the self-registering apparatus above referred to, a portion of which was invented by Mr. Daniel Draper, and the rest improved from European instruments by the same gentleman, and by which, to use the language of the report, "the weather each day leaves, by its own action, an enduring picture of itself, complete and accurate, presenting a marked contrast to the ordinary methods of weather observation. The records of the observatory frequently sought for to determine legal controversies, are given weekly to the newspapers for publication, and are forwarded to kindred institutions."

The report is a well-written and comprehensive document, and the favored few who are able to obtain copies of it, will doubtless read it with interest throughout. The Commissioners are entitled to great praise for the vigorous and judicious manner in which they have discharged and are discharging their duties, and the additions they are constantly making to the chief attraction of our great metropolis.

WOODBURY'S PHOTO-RELIEF PROCESS.

A few years since Mr. Woodbury explained to us in Paris his famous process for obtaining pictures by copying negatives with gelatin and transferring the print to soft metal. Since that time he has made some improvements, and we give below the whole method as witnessed by ourselves, and as described in some of the photographic journals.

A film of gelatin rendered sensitive by bichromate of potash is exposed in a common printing frame to the action of the sun or electric light. Where the light acts, the gelatin is rendered insoluble, where it does not penetrate, the gelatin remains soluble. If, therefore, the film of the exposure be put into warm water, the parts acted upon by light will be dissolved out, and the other portions will remain to form a picture in relief.

This gelatin picture is laid upon a steel plate, then covered with a plate of type metal, and subjected to pressure under a small hydraulic press. The raised parts of the gelatin film are forced into the soft metal, thus giving a picture with the lights and shadows reversed.

Upon this metallic *cliché* is poured a hot mixture of gelatin with some coloring substance, a sheet of well-sized paper is then laid on, and the whole is well pressed together. As soon as the gelatin is cool, the impression is done.

In order to render the impression permanent it is immersed in a solution of alum or of tannin—it would otherwise be soluble in water.

This is the outline of the process, and we come now to speak of the details.

A glass plate is greased and covered with a hot solution of gelatin containing some pigment and bichromate of potash. After drying, the film is covered with a thick layer of paper collodion. It is then removed from the glass, and kept on a portfolio until wanted. The greasing of the glass facilitates the removal of the gelatin. The film is quite black, and as thick as pasteboard. The coloring matter is added to aid in following the development of the picture, and the collodion serves as a support to the film.

The gelatin sheet thus prepared is laid in a printing frame, with the collodion side in contact with the negative. It is then exposed either to the sun or a powerful electric light. The length of exposure is half an hour in the sunlight, and two to four hours in electric light. The sunlight is preferable because the rays are parallel and more powerful. The electro-magnetic apparatus consists of fifty horseshoe magnets, and the helices are propelled by a steam engine of six-horse power.

Usually six printing frames are simultaneously exposed at a distance of a few feet. A large sheet of white paper serves as a reflector. The light is evolved between two carbon pencils which are connected with the magnetic-electro machine, and is so uniform, that, with a little experience, the duration of the exposure can be estimated by the appearance of the negatives. A glass plate is covered with a solution of india-rubber in benzine. The exposed sheet with the collodion side down is pressed upon it (to prevent the curling up of the film in water), and the plate is laid in warm water, and the water is renewed from time to time. The development requires considerable time, often twenty-four hours. The coloring matter dissolves in the places where the gelatin has remained soluble, and finally leaves a clear picture. The print is then taken from the water, removed from the glass plate, and dried. It forms a beautiful transparency, and is a true picture in relief, in which the deepest shades possess the original thickness of the gelatin film.

This gelatin relief is pressed into a metal plate in a similar manner to nature printing. It is laid upon a hard steel plate and covered with a sheet composed of antimony and lead ¾ of an inch thick. It is then exposed for five minutes to a pressure of half an tun to a cubic centimeter in an hydraulic press, by which a sharp impression is obtained on the soft metal without the least spreading or injury of the gelatin film.

The *cliché* is cut with a saw, and made ready for the printing press. It is carried to a room where there are a number of large revolving tables, on each one of which there are six presses. There is one workman for every table, who is provided with a pot of dark-colored gelatin kept hot in a little stove.

The *cliché* is put entirely horizontal into the press, which is simply an iron box with a metallic cover. Some of the colored gelatin is poured upon the middle of the *cliché*, the cover put on, and the table revolved until the second press is before the printer. By the time the sixth press has been reached, the picture in the first press is ready for removal. A skilled printer can take forty impressions in an hour.

The paper is rendered water-tight by lac, and is then well glazed. After each print the *cliché* is wiped off with an oily rag to remove any adhering color. The gelatin must harden in the press; the print is laid upon a table until it is entirely dry and hard. The margin of gelatin squeezed out by the press is cut off and thrown into the glue pot to be used again. The color improves by use. Finally, the prints are immersed in a solution of alum, then washed, dried, and cut ready for mounting.

Mr. Woodbury has made some further improvements by which he can use fatty inks the same as with copperplate engraving.

Electrotypes can also be taken of the *clichés*, and this is one of the most important applications of the process, as it admits of taking photographs of all manner of natural objects, of copying them in gelatin and of obtaining electrotypes for printing in the usual way. Prints in gelatin and color have the great advantage over ordinary photographs of being much more permanent—they are as unfading as any steel engraving, and are very rapid of execution.

We are glad to know that the inventor, who has been indefatigable in his efforts to perfect his process, is now beginning to reap the rewards of his labor.

THE GATLING BATTERY GUN IN ENGLAND.

The trial of the "Gatling Battery Gun" at Shoeburyness, has given the British authorities a very favorable impression of its formidable character. The small Gatling gun of forty-two one hundredths of an inch caliber was tried first. This gun has ten steel rifled barrels, and is made of any proper caliber to suit the musket cartridges used by different governments. It was fired at the high rate of about 350 shots a minute. The one-inch gun was tested next. This is the third or largest gun of the system, and is made with six, sometimes with ten, barrels, and discharges solid lead balls half a pound in weight. It also uses a canister cartridge which contains sixteen balls. It also discharges explosive balls with great effect. At this test it discharged 255 half-pound balls in one minute and eighteen seconds, and riddled the target at 1,400 yards. On the same day the small gun (No. 1) was again discharged at 1,400 yards, and made an excellent target, firing about 375 shots a minute. It was also fired at dummies representing a company front, on uneven ground, the men being disposed in irregular order. There were 136 dummies, representing men, 99 of whom would have been killed. The average hits were four in each man.

Subsequently, the small gun was again fired at various ranges from 1,200 down to 400 yards at targets and at dummies. The firing was at about the same rate and speed as before, making the same targets and producing the like destructive effect among the dummies. All on the ground seemed to agree that they had seen the operation of a weapon of unprecedented power.

Our readers will be interested in the history of this remarkable gun, from the pen of Mr. Gatling himself.

A man is entitled to the fruits of his labor, and to assert a just claim is a duty as well as a right. In the year 1861, I

© 1870 SCIENTIFIC AMERICAN, INC.

first conceived the idea of a machine gun, which has been ever since the great controlling idea of my life; and it certainly cannot be regarded as egotism when I express the belief that I am the originator of the first successful weapon of the kind ever invented. A brief history of this arm may esablish the fact, and cannot fail to engage the attention of all who take an interest in fire-arms.

I completed my first "battery," or "machine gun," in the city of Indianapolis, State of Indiana, my place of residence, in the early part of the year 1862, and my first American patent bears date November 4th, of the same year. The gun was fired repeatedly during that year, in Indianapolis, in the presence of hundreds and thousands of persons, over two hundred times a minute, and the result published to the world.

In the autumn of 1862, I went to the city of Cincinnati, in the State of Ohio, and in the well-known establishment of Miles H. Greenwood & Co., I had six of my guns constructed; but about the time they were completed the establishment was destroyed by fire, together with the guns, patterns, and drawings, subjecting me to a very heavy pecuniary loss. Shortly afterwards, I had twelve of my batteries manufactured at another establishment in the same city. In the meantime, I continued to fire my gun, made at Indianapolis, before the citizens of Cincinnati, and in the presence of many Army Officers of rank and distinction, all of whom were highly pleased at the result of its performance. The American press of 1862 and 1863 teemed with accounts of these trials, and during all this period no notice of a similar weapon, at least none equaling or approaching the "Gatling battery," in the rapidity of its firing, appeared in any of the papers published in America or Europe.

I made no effort to keep my invention a secret, but, on the contrary, published full descriptions of the gun, with cuts and diagrams, and sent the same to all parts of the civilized world. I stated in these descriptions that my invention consisted of a "series of barrels," parallel to each other, arranged around a central shaft, and that "each of the barrels was furnished with its own appropriate lock, or firing mechanism;" I also described it as a "compound machine gun," that is, many guns in one. At the time I made these publications, that "mysterious" French mitrailleuse, of which we have since heard so much, was not invented, and, in my opinion, not even thought of. It is well known that the French and Montigny mitrailleuses are composed of a number of barrels, and have a lock or firing device for each barrel, and, for reasons submitted hereafter, I have no hesitation in saying, that this feature of a gun, formed of many barrels and many locks, is copied from my invention.

I continued to make my guns in Cincinnati during the years 1863 and 1864, and in the autumn of the latter year, I made additional improvements to my battery—in the locks and rear cam—but without, however, changing its main features, for which I secured a second patent of the United States, bearing date May 9th, 1865.

In the years 1865 and 1866, these improved guns were manfactured at Cooper's Fire Arms Manufactory, in the city of Philadelphia, but since that time they have been constructed in large numbers, at Colt's Armory, in the city of Hartford, where machinery has been fitted up at great expense, to build the guns in the highest style of perfection.

This gun is now on exhibition at the Fair of the American Institute in this city.

COMPARATIVE ACCURACY OF MERCURIAL AND ANEROID BAROMETERS.

During the progress of the recent official surveys for the ship canal across the Isthmus of Darien, the level lines were ascertained by spirit levels, and also by barometic observations. The mercurial and the aneroid barometers were employed, and their indications were, from point to point, compared with those of the spirit levels. The result showed that the aneroid barometer was very unreliable, as its indications of level were frequently in error to the extent of one hundred feet, while the average deviation of the mercurial barometer from the spirit level, did not exceed twelve feet.

Our readers are, of course, familiar with the construction of the mercurial barometer, in which a column of quicksilver, 30 inches high, counterbalances the weight of a column of the air, of the same diameter, and 100 miles, more or less, high. When we rise above the sea, the weight of the air diminishes, and at an altitude of 5,000 feet the mercury column stands at 24·77 inches, instead of 30 in. as at the sea level. The hight of hills and mountains may therefore be measured by placing the barometer at the highest point of elevation, and observing the position of the mercury.

The mercurial barometer was invented in 1643, by Torricelli, an Italian, a disciple of the famous Galileo. The term barometer is derived from Greek words signifying "weight-measurer."

The aneroid barometer is a more recent invention. It is made wholly of metal, and consists of an air-tight box, which may be described as somewhat resembling a common tin blacking-box, except that the edges of the barometer box are creased so that the flat faces may spring towards or from each other, when pressure is applied to them. One of the faces is connected with a delicate wheel mechanism and a pointer by which the slightest movement of the box face is indicated to the eye. The interior of the box is charged with hydrogen gas, and the faces are so set that at the sea level the pointer will stand at a given degree, say 30. Any variation in the pressure of the air will alter the position of the faces of the box in respect to each other, and the change will be indicated by the pointer.

The aneroid barometer has come into very extensive use, and has heretofore been considered a reliable and excellent instrument. During a voyage across the Atlantic, we once compared the relative merits of the mercurial and the aneroid barometers. The ordinary indications were the same with both instruments; but the aneroid was considered preferable by the officers of the vessel as it was more sensitive to atmospheric changes than the mercurial. The aneroid always indicated the approach of bad weather, or the change to fair, in advance of the mercurial instrument.

It may be that the aneroids used on the Darien expedition were in some manner defective.

The aneroid barometer is a very neat and compact instrument, not easily broken, readily transported, and very serviceable. It was invented about twenty-two years ago by M. Vidi, of France.

The term aneroid is from Greek words, which signify "without fluid;" no mercury being employed in the aneroid barometer.

FAIR OF THE AMERICAN INSTITUTE.

We have noticed in order certain departments of this Fair, and for the future shall select for notice from the other departments such things as may seem of interest, without regard to strict classification.

Among these we find a patent machine for "spreading" flax, hemp, etc., which takes the material from the bale, and lays its fibers all parallel, turning them out in a continuous sliver in a very expeditious and beautiful manner. The hemp or other similar material, in the condition in which it is ordinarily taken from the bale, is placed upon the feed-board, and gradually brought to feed-rollers, which convey it at the requisite speed to and upon an endless chain apron covered with heckling pins, which measurably straighten and comb its fibers. From this it passes to another endless chain, running at higher speed, the pins of which complete the heckling operation. The hemp is thus combed and drawn out by the pins of the two endless chains, while the fibers are free at one end to accommodate themselves to such action. The hemp then passes therefrom to pressing and drawing rollers, which, having performed their function, the material passes through condensing tubes in the form of a sliver. To any who delight in examining the workings of well devised machinery, the operations of this machine will prove gratifying. The machine is exhibited by John Good, of Brooklyn, E. D., N. Y.

A cotton seed hulling machine is shown by T. M. Jewell, 93 Liberty street, New York. It is designed for plantation use and can be run separately from the gin, or attached to the gin and driven by the same power. When run by itself it is driven by the power of two mules. It is claimed to remove the hull and lint entirely from the seed and to leave the kernel unbroken. At the same time the kernels are dried and cleaned by an air blast, and, it is claimed, rendered fit for shipment to any distance. Our readers who have perused the valuables article on "Cotton Seed" and "Cotton-Seed Oil," published in our last volume, will be prepared to appreciate the value ot a machine that will do what is claimed for this one.

A line of power and foot punching presses shown by N. C. Stiles, Middleton, Conn., is worthy of notice. Those interested in this class of machines, and who visit the Fair, will do well to look at them.

Shaw's Patent Gunpowder Pile Driver, exhibited by the Gunpowder Pile Driver Co., 505 Minor street, Philadelphia, attracts much attention. This novel and ingenious device was fully described and illustrated on page 97, Vol. XXI., of Scientific American. For the short time this invention has been before the engineering public it has made a brilliant record.

A flax scutching machine, shown by William McBride, Somerville, N. J., is also a very ingenious device. The flax is fed in under an endless belt, the belt pressing upon the middle of the fiber, and holding it firmly while it passes and is acted upon by a series of revolving scutching blades which dress one end of the mass. Then the machine turns the other end of the flax fiber, so that it in turn passes another series of scutching blades, and finally delivers it well dressed for future operations.

FIRE-ARMS.

Under the superintendence of Col. Geo. Woodward, 304 West street, New York, this department has been made a most attractive feature of the Fair.

Col. Woodward represents nearly or all the first class manufacturers of fire-arms in the United States, and his politeness and affability, his intimate knowledge of the arms exhibited, and his readiness to explain to the curious the peculiarities of the weapons shown, render this department a rare opportunity for any who wish to post themselves on the subject of modern fire-arms. Most of the guns shown are breech-loaders, and are made in the very highest style of the art.

A prominent object in this connection is the Gatling battery gun, quite recently described and illustrated in this journal, exhibited by Chas. H. Pond, 179 Broadway, Agency, Winchester Arms Company and Gatling Gun Company. We need not here repeat any details of this remarkable arm, which as a destructive weapon is probably unexcelled by any similar piece ever constructed. The same exhibitor shows a case of the Winchester repeating arms.

The Winchester rifle differs from the Henry rifle only in the mechanism by which the cartridge is extracted. It is claimed for this gun that it can not only be fired thirty times a minute continuously as a repeater, but it can be used as a single loader without any attachment to be changed for the purpose, retaining the magazine full of cartridges to be used in any emergency, when the whole fifteen charges can be fired in fifteen seconds, or at the rate of sixty shots a minute, or in double-quick time, in seven and a half seconds, or at the rate of 120 shots per minute, or two shots per second, loading from the magazine.

The Providence Tool Co., Armory, Providence, R. I., exhibit a case of the Peabody breech-loading fire-arms. In these arms no movement of the barrel or any other parts, except those immediately connected with the breech block, is required in the performance of any of the operations. The mechanism is designed to prevent any possibility of obstruction from the effects of friction, rust, or exposure to dust, rain, and continued service. The condition of the breech block, when the guard is drawn down, is such as to form an inclined plane, sloping towards the breech of the barrel, and the groove on its upper surface corresponding precisely with the bore of the gun, facilitates the entrance of the cartridge, so that it slides directly into its proper position without the necessity of looking to see that it is properly inserted. The removal of the empty cartridge is effected by the action of an elbow lever, which throws it out the instant the guard is lowered. This lever derives its power from the action of the breech block itself, and is not dependent upon any spring and is of such strength as to seemingly prevent the possibility of breakage or derangement by any service to which it can be exposed.

Ward & Co., 57 Wall street, New York, show a case of the Ward-Burton breech-loading rifles. The Ward-Burton gun is constructed on the bolt or needle gun system, and is operated by holding the piece in the left hand below the lower band, in the position known in the manual for muzzle-loading arms as "prime," and seizing the handle of the breech with the right hand, nails uppermost. The breech is then opened by turning the handle up and withdrawing it to its full extent of motion, a cartridge taken from the pouch with the right hand and dropped bullet end to the front in the now open receiver, and the breech closed by reversing the motions required to open it. By the motion of opening the breech to reload, the empty cartridge shell will be ejected. The breech, however, may be closed during the act of raising the gun to the position of aim. A manual to load and fire by command in six motions may thus be readily devised. Practically, to load and to fire require but four motions.

S. Remington & Sons, of Ilion, N. Y., show a collection of the various arms manufactured by them. These arms are too well known to need any special description here. The exhibitors are now supplying arms to Egypt, Italy, France, Austria, and Denmark; France at present taking all the available stock. The details of the guns thus furnished to foreign governments vary in nothing except the form of the bayonets. The bayonets on the Egyptian guns are sabers, with hilt and guard; the others are triangular.

Isaiah Woodbury, 39 Broadway, New York, exhibits specimens of the "Roberts" Breech-loading Musket. This arm is constructed strictly on the lever plan, having lever strength for its entire operation. The breech plug is a lever, the extractor is a lever, and the "catch" that holds the breech plug in place for firing is a lever. These are the principal pieces that take the wear and tear of fire-arms; they are all of great strength, and so mechanically combined as to receive the recoil shock of the charges without cross strain or disposition to displacement.

The Sharp's Arms Co., of Hartford, Conn., exhibit their infantry carbines and repeating rifles. These celebrated arms are fine specimens of mechanical art, and have a reputation so widely extended that we need not dwell upon the prominent features of their construction.

M. W. Robinson, of 79 Chambers street, shows a fine group of the Wesson sporting rifle pistols, and a case of Smith & Wesson's well-known revolvers

J. W. Storrs, 252 Broadway, New York, shows specimens of the "Central Fire" breech-loading shot guns manufactured by the Wesson Fire-arms Company, Springfield, Mass. These guns are beautiful pieces of workmanship, and will be admired by all sportsmen who examine them. The same exhibitor shows specimens of J. Stevens and Co.'s breech-loading pocket rifles, each of which weighs only eleven ounces, yet shoots with great accuracy and power from thirty to one hundred yards or more; can be loaded and fired five times a minute, can be carried in a side pocket while working in the fields, ready to bring down game at short notice.

Isaiah Woodbury, 39 Broadway, New York, shows some electric batteries and battery fuses for blasting purposes, in which the spark which ignites the powder is generated by frictional electricity. We regret that we could not obtain any information in regard to the details of the internal construction of his device.

Near the collection of fire-arms in one of the alcoves may be seen the screw steering apparatus illustrated and described on page 111. It is exhibited by the manufacturers, James L. Jackson & Bros., 315 East Twenty-eighth street, New York.

We noticed, also, near the entrance to the Machinery Department, a novel and ingenious printing press, called the "Chromatic" press, which prints in three colors with a single impression, and does its work as rapidly as any platen press can print in single color. The surface of the inking cylinder is divided into three equal parts, which are supplied with adjustable sectors (or color strips) of various sizes, to correspond in width with any line or part of line of type. Each part is supplied with a color from one of the distributing rollers. The cylinder has lines struck on its surface which are numbered to correspond with lines and numbers on the chase, making simple work for the pressman to set his sectors to correspond to the lines of the type which he may wish to print in colors. Thus, having the sectors arranged, they receive their proper colors and transfer them to the type rollers, corresponding in width and position with the lines of the type to be printed. Within one minute the press may be changed from two or three colors to one, by means of throwing two polished shells or half cylinders over the color arrangements, which enables the pressman, if he desires, to use three times the amount of distribution and inking surface that he now has in any one-color job press.

Those interested in ice manufacture and ice machines will soon have the opportunity to see the celebrated Carre apparatus at work in a special room assigned to it at the rear of the building. A skating ring 24x10 feet, and laid with ice eight inches thick is promised as soon as the machine gets under way. This will be a most interesting feature of the

© 1870 SCIENTIFIC AMERICAN, INC.

Fair. The machine is exhibited by M. J. Bujac, 17 Broad street, New York.

In the sewing machine alcove there is little that is new. An automatic bobbin winder, shown by Pratt, Palmer & Co., 384 Broome street, New York, is a neat device and does its work in a very complete manner. It is much noticed by the lady visitors to the Fair.

Leyburn's motive power for sewing machines also attracts much attention. This motive power, which may be attached to any of the machines, enables a rocking motion of the upper part of the body to be substituted for that of the lower extremities at the will of the operator. This motor accords entirely with suggestions editorially made in this journal June 12, 1869, and we believe it to be a good and health-saving device. Exhibited by Ed. J. Leyburn, 119 Fourth avenue, New York.

The Carpenter Sewing Machine Needle Company, 95 and 97 Liberty street, New York, exhibit the self-setting and self-threading sewing-machine needle illustrated, and described on page 164, current volume, which is attracting much attention, and eliciting much commendation from the experts who pass among these machines in search of novelties. Specimens of its work show that the needle is strong as well as convenient.

The Carpenter self-heating fluting machine is an invention of the same lady to whose genius the self-threading needle is due. The fluting rollers are heated by the conduction of heat through arbors, upon which they work, the heat being supplied by a gas jet. It is an ingenious and pretty little machine.

A neat little model of a horse-stall, described and illustrated on page 279, last volume, of the SCIENTIFIC AMERICAN, will also be found worth looking at. It is shown by William Bleakley, of Verplanck, New York.

We also noticed a railroad candle and burner invented and exhibited by Henry Ryder, of New Bedford, Mass., which seems to remove the defects existing in the lights now commonly used. The candle has two self-snuffing wicks, and the draft is very much improved. The light given by this apparatus is much superior to that usually supplied in railway cars.

WHAT A CONTRAST.

We call attention to the letter of the veteran inventor, Pells Manny of Freeport, Ill., published elsewhere, and from which it appears that Mr. Manny has not only gained a competence as the just reward of his patent ingenuity; but like the venerable Rip Van Winkle "he is thankful that he has had enough." What a beautiful picture is here presented! An inventor retiring upon his well earned honors and emoluments, to engage in the healthful and primitive occupation of a vine-dresser. In reading this complaisant note of Mr. Manny, we could not fail to notice his magnanimity in contrast with some other greedy patentees, who, having got rich out of their patents by the full enjoyment of all the protection afforded by the law, are still clamorous for more, and misdemean themselves by lobbying around the halls of Congress, coaxing members to favor their schemes of patent extension over luscious Chesapeake Bay ducks, and sparkling Jersey champaign. We can scarcely realize so much self-abnegation as Mr. Manny displays; but it is a green spot in the desert of human selfishness.

Trial of the United States Chemical Fire Engine.

This machine, which employs a solution of sulphite of soda, instead of pure water, for extinguishing fires, was publicly tested on the 4th inst., in this city on a vacant lot situated between 3rd and 4th avenues, just above 67th street. Two two-story buildings were erected, and in each were placed a large number of tar barrels. The floors and other parts of the building were drenched with gasoline in such a manner that when the buildings were fired the flames rose to a great hight, and the heat was intense. One of the structures was played upon in small streams by the sulphite of soda solution, and the other by water, pure and simple, to test the relative merits of the two systems.

The result, however, was not so satisfactory as could be desired. The frames of the buildings were too weak to sustain them after they had been slightly damaged by the flames, and each fell into a heap of ruins very shortly after the fire became general. It was evident that the sulphite of soda solution is an agent of great power in extinguishing fire, and we opine that should the experiment be repeated with buildings of stronger frames, the test would prove much more satisfactory. The sulphite of soda, when it comes in contact with the burning surfaces, is decomposed, yielding sulphurous acid gas, in which no flame can live. At the same time the effect of this gas upon the firemen, who may at times inhale it, is not so much to be dreaded as that of carbonic acid gas, which has been used in aqueous solution for the same purpose. We trust the experiment may be repeated under more favorable circumstances.

IT PAYS TO ADVERTISE.—Messrs. Wetherby, Rugg & Richardson, of Worcester, Mass., manufacturers of Woodworth's planers and wood-working machinery, in a recent letter to us say: "You will please continue our advertisement until orders to the contrary are received, and send your bill for settlement as heretofore. We cannot do without your paper as a medium between ourselves and our customers."

THE GIANT COUPLING.—It was intended to be stated in our notice of this unique and very useful invention, illustrated on page 207, that George Place & Co., 126 Chambers st., New York city, Miles Greenwood, of Cincinnati, and the Howard Iron Works, Buffalo, N. Y., were also agents for the sale of the coupling.

[Our Special Correspondence.]

LETTERS FROM THE SOUTH, ETC.

New Orleans, its Sewerage and Water-Works—Cotton, Cotton Factories, Cotton-Seed-Oil Mills—New Orleans as a Manufacturing Place and as Commercial Center—Ice Making and Pneumatic Car—Salt and Sulphur deposits—Sugar Crop—Railroads.

MOBILE, ALA., Sept. 17, 1870.

Instead of being to-day two or three hundred miles west of New Orleans, and in the limits of the Empire of Texas, I am that distance east—yellow fever panic is the cause thereof. The first idea that occurred to me on looking around New Orleans was why some shrewd person did not contrive a way of cleaning and sewering the streets. The city is as level as a floor, and all the sewerage runs in open gutters along the streets. Garbage is, however, not allowed to be thrown in the streets.

The city is supplied with water from the river, pumped up into a large reservoir, thence flowing into pipes. Being built on entirely made ground, and located in the bend of the river, a slight incline is had from one side to the other, thus keeping up a current in the side ditches.

From Memphis I came through the length of the great cotton State, Mississippi. The railroad, one of the best in the South, goes through a rather poor section, but there are along its route many thriving villages. One little place, consisting of a depot, half a dozen stores, and a few dwellings, sends off 20,000 bales of cotton per year. The exclusive growth of cotton is the curse of the State.

J. L. Power, Esq., of the Agricultural Association, hopes to infuse some new ideas and new life into the people, and if example can do anything he may succeed. It is hard to make Mississippians believe that there is any crop but cotton worth growing. There are two cotton factories in the State, one at Columbus, the other at Wesson, on the Great Northern Railroad. The last is the largest, and runs about 4,000 spindles. Steam power is used, and wood for fuel.

At Vicksburg there are three cotton-seed-oil mills, which made last year about 160,000 gallons of oil, and about 4,000 tuns of cake. The owners claim that the business is overdone; that at present the supply is greater than the demand. My opinion is that as the price goes down, new uses will be found for it. The various mills I have visited pay from $6 to $12 a tun for seed. A tun of seed yields 1,000 pounds of kernel, this 750 pounds of cake, from 35 to 40 gallons of oil, and 40 to 50 pounds of lint. This is of course a rough estimate, but nearly, and in some cases, perfectly accurate.

In New Orleans there are five mills. The largest, the "Orleans," does not hull its seed, hence it makes from a tun about 1,500 pounds of cake, not so valuable for feed. It uses 10,000 tuns of seed per year. The other four use 18,000 tuns of seed, and hull as at Vicksburg and Memphis. In Mobile there is also a mill which uses about 4,000 tuns of seed. This last is manufacturing a fertilizer from its cake and other materials, as does the Panola Company, in Memphis. It can thus be seen that this is really becoming a large and valuable manufacturing interest. As, for instance, at the average price of $10 per tun, the New Orleans' mills alone pay out $280,000 to the planter. It must be borne in mind that the planter receives this price at his gin-house or landing. I have thus particularly alluded to this manufacture, as it is already a great, and will continue to be a growing industry of the South.

New Orleans is not a great manufacturing place There are a number of sugar refineries, and great efforts are being made to bring the grain of the West through the city. Two obstacles will ever prevent its being a great grain market: the warm climate, and the constant liability to yellow fever at the very time of the year when the grain should be moving. The river trade of the city has been injured by Memphis, and the railroads carry eastward much cotton which once went only through its harbor. There is considerable talk of the benefits to be derived from the Ship Canal to Ship Island Sound, but as yet the plans are too limited in their details to effect any good to the city. So far a depth of only 10 feet is proposed.

The only special objects of interest about New Orleans are the shell road, the cemeteries, and water-works, and I may add, just at this time, the ice machine, and the pneumatic car motor. The former is a great success; the latter, unfortunately is not yet perfect, but the owners have great hopes. The ice machine men claim that they can make ice at a cost of ¼ cent per pound. They get up—or down—their cold by the decomposition of ammonia salt. It is a French machine, and very costly.

We were shown immense blocks of rock salt from the mines in Southwest Louisiana. This deposit of salt lies 16 feet under the ground, has been worked to a depth of 80 feet without any signs of failure, and from the main shaft tunnels have been driven 180 feet each way. The salt is mixed and delivered at Broshear City at $13 per tun. The soil above is a sugar plantation, and will this year produce 300 hogsheads of sugar. Farther west and south is the great sulphur deposit, which unfortunately is in the hands of the lawyers, and hence its value is not likely to be developed for years. I was told that 100,000 sacks of salt were taken from the mine in six months, that the supply is limited only by demand, and that it may be afforded at very cheap rates.

The sugar season has not yet commenced, but the crop is said to be fully 25 per cent larger than last year. Mr. Lawrence has made his steam plow a perfect success.

Three new railroads are finding their way into New Orleans; one from Mobile, the others from Selma and Meridian, thence northwards to Chattanooga. The first and last of these lines are under the control of the Alabama & Chattanooga R. R Co., which is really the old Union Pacific R. R. Ring. They are much abused by some of the people here, but are doing the country a great deal of good. I shall allude more particularly to them in connection with Alabama.

Stirred up by this new and rival interest, Chas. Morgan is rapidly pushing his Texas Railroad, while parallel with him the Alabama & Chattanooga men will run another line.

These rival interests bring good to the people, or rather to the country, for most of the people had rather plod along in the old way. Their places will be taken by other and more energetic men in time. The climate, however, is enervating yet. I can never believe that Heaven intended all this vast area of immensely rich soil to remain an uncultivated wild. The solution of the problem has commenced, the end is not so sure. The Chinaman and the steam plow may settle it.

H. E. C.

Immigration.

The following synoptical table exhibits the total number of immigrants that arrived in the United States during the fiscal year ending June 30th, 1870, and their nationalities:

COUNTRIES.	IMMIGRANTS ARRIVED IN 1869-'70		
	Males.	Females.	Total.
Great Britain	63,369	40,316	103,685
Ireland	31,414	25,582	56,996
German States	73,027	49,621	122,648
Sweden and Norway	16,309	10,350	26,659
Denmark	2,519	1,564	4,083
Holland	663	403	1,066
Belgium	718	284	1,002
Switzerland	2,012	1,073	3,085
France	2,689	1,316	4,005
Spain and Portugal	655	256	911
Italy	2,132	759	2,891
Russia and Poland	690	440	1,300
Other countries of Europe	28	2	30
China	14,624	1,116	15,740
Africa	26	5	31
British North American Possessions	22.720	17,683	40,403
Mexico	352	101	453
South America	59	10	69
Cuba	816	357	1,173
West Indies	315	98	413
Azores	275	167	442
All other countries not stated	139	423	182
Total	235,551	151,546	387,097

Fair of the Central Agricultural and Mechanical Association, Selma, Alabama.

The Second Annual Fair of this association, will be held at Selma, Alabama, in November next, commencing on Tuesday the 8th, and continuing four days. The directors are making ample preparation for the display of all articles which may be brought for exhibition, in all the departments. The unexpected success of the First Annual Fair, and the encouragement received from every direction, induced them to double the area of the grounds of the Association, to erect large and commodious buildings, provide artesian wells and beautify the grounds to an extent that will make their location at once the most convenient and attractive place of resort in the South. The corresponding secretary is Mr. Wm. M. Byrd, Jr.

Trial of the Aveling & Porter Steam Road Roller at Orange, N. J.

This machine, purchased by Daniel Brennan, Jr., in England, for use in this country in the construction of broken stone pavements on the Telford and Macadam systems, was tested for the first time, on the 29th of September, on Main street, East Orange, N. J., in the presence of a large number of invited guests. The section of road on which the trial took place was a Macadam surface, and the test gave general satisfaction. Mr. Brennan imported the machine at an expense of $5,000. It weighs 36,000 pounds. Much interest is felt in the success of Mr. Brennan, a young man of great enterprise, and to whom has been awarded contracts for a number of miles of Macadam pavement in the young city of Orange.

Trade-Mark Decisions.

Two English decisions are recently reported.

1. *Title: acquiescence.*—When a man has learned a trade secret from his employer and practiced it after the employer's death, selling the article under the old name, he will not acquire such a right to the exclusive use of the name as a trade-mark as will be protected in a court of equity.

2. *Semble*—Where a trader acquiesces in a particular infringement of his trade-mark for a considerable period during his life, his representatives will be unable to restrain it after his death.

IN looking over the portfolios of the Patent Office we are always reminded of the want of care and skill displayed by some solicitors in the preparation of drawings accompanying their applications for patents. Poor, scratchy drawings are the rule; good ones the exception. Some solicitors seem to be anxious only to crowd in their cases. No matter about the character of the drawings. The Commissioner ought to insist upon a decided reform in this respect.

MR. PHILIP STRICKLER, of Timberville, Va., whose communication on balancing cylinders and runner millstones will be found on another page, states that he has a number of good inventions in mills and fire-arms for which he would like assistance to secure patents. He offers to make liberal terms with capitalists who would contract to take out patents for these inventions.

SURVEYS OF THE ISTHMUS OF DARIEN.—The results of the recent surveys of the Isthmus, undertaken by the United States Government, with a view to the construction of a ship canal between the Atlantic and Pacific, show that a tunnel ten miles long, and high enough to accommodate the masss of ships, would be required. The expense is regarded as too great to warrant the undertaking. Further surveys towards the south are yet to be made.

© 1870 SCIENTIFIC AMERICAN, INC.

Facts for the Ladies.

We are very happy to be able to recommend Wheeler & Wilson's Sewing Machines to all persons who may be wanting an article so useful as a Sewing Machine. After an experience of ten years, we are not only able to to speak with confidence of their usefulness, but, also, of their great superiority over all other machines that we have tried in our establishment. These Sewing Machines have three advantages of great importance—rapidity of motion, adaptation to a greater variety of work and material, and little or no expense for repairs.

SISTER MARY,
Sister of Charity.

Providence Nunnery, Montreal.

You Cannot Do a Better Thing

For your Wife, on a washing day, than provide her a Doty Washer and Universal Wringer. It will keep aches from her back and arms, wrinkles from her forehead, and roughness from her hands. It will do the work of a hired woman, and save your linen from being scrubbed out and her temper from being chafed out.—[New York Weekly Tribune, March 22, 1870.

Many of the Largest Advertisers

In the country make all their contracts with newspapers through the Advertising Agency of Geo. P. Rowell & Co., No. 40 Park Row, New York. Their facilities for the transaction of the business are not excelled by those of any similar establishment in the world.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal.

All reference to back numbers should be by volume and page.

W. J. B., of N. Y., writing to ascertain what will remove walnut stains from the hands, is answered by

R. S., of Vt., who states that slices of ripe pears rubbed on the hands will remove such stains. This may be correct; but, if so, the action must, we think, be due to the malic acid contained in the fruit. If this view be correct, green apples, which contain a much larger proportion of malic acid, ought, it would seem, to be still more efficient. There are various organic acids that will remove vegetable stains. Of these oxalic acid is one of the most powerful, but it is very poisonous, and requires to be used with much care. Citric acid or lemon juice, which contains a large proportion of citric acid, is also very good for removing many kinds of stains, and is safe to use. When the hands are stained no soap should be used to wash them previous to the use of acids for taking off the stains, as the alkali of the soap acts as a mordant to render the stains permanent. Where any of the acids named are used, the washing should be completed with pure water.

D. H., of Mass.—India-rubber can be dissolved in turpentine, animal oil, ether, or benzole, by introducing the solvent in the form of vapor, into a vessel containing the india-rubber in small pieces; the vessel being then exhausted of air, and kept at a required temperature by means of steam. Or it will dissolve in these fluids by simple immersion in them, when heated, but more slowly and imperfectly. Benzole or benzine as it is commonly called, and other hydrocarbons of a similar character, dissolve it cold. Chloroform also dissolves it, but undoubtedly the best solvent for general purposes is benzole. We doubt if you will succeed in making finger cots by this process. There are secrets of experience essential to success which manufacturers jealously guard.

G. D. F., of S. C.—The paragraph to which you refer, as going the rounds of the press, stating that the Little system of transmitting telegraph messages enables 400 words per minute to be sent from Washington to New York, is correct in that statement. We have ourselves been lately investigating this system, and have now in our possession a message of about six hundred words transmitted at that rate, and distinctly legible. Your idea that this system could be substituted for short hand reporting is not correct, as the messages have to be first prepared by puncturing strips of paper on a machine for that purpose, a much slower process than short-hand writing, and the transmission is effected by an automatic machine that can only speak what is put into its mouth on the punctured paper slip.

C. E. K., of Mich.—Many learn to run locomotives by commencing wiping, and so climbing through the post of fireman finally to engineer in charge. In fact, that is the apprenticeship usually practiced we believe in England. We believe, however, that the learning of the machinist's trade in a locomotive shop is the best beginning. Certainly, all other things being equal, he who knows how to build and repair a locomotive is best qualified to run it. Besides, all men having the requisite knowledge are not qualified by courage or strength of constitution to endure the hardship of a locomotive engineer's work. Having learned the machinist's trade, you would have something to fall back upon in case of failure.

J. W., of R. I.—There is no way that we know of, and india-rubber manufacturers tell us there is *no practical way* of fastening india-rubber to metal, except by dovetailing it in, or some kindred process, while the rubber is yet soft and previous to the vulcanizing process. If, in this time of many discoveries, a cement has been found that will cause rubber to firmly cohere to metal, we shall be glad to receive the formula from any of our correspondents who may chance to know it.

E. J., of Ill., says that the water from a certain well is raised by means of three buckets, and that it is proposed to add another. The question arose whether the use of the extra bucket would add one third more, or one fourth, to the volume of water discharged. The parties, unable to agree, wish us to decide. We answer the extra bucket increases the discharge one third.

J. S., of S. C.—It will not injure your plain cylinder boiler to drill an inch hole in the end in the top remote from the boiler, and insert therein a pipe to convey steam to the lint room of your gin-house, provided the work is done in a workman-like manner.

C. M. B., of D. C.—A wire of fifty miles in length of iron might without doubt be made so small that it could be wound on a single reel of not very exagerated dimensions. There would be no difficulty about flexibility. The size of the coil would of course depend upon the diameter of the wire.

W. B., of Ca., wants to know how japaning is done by steam heat, the construction of the ovens, etc. We have never seen japaning done by steam heat, still it is quite possible it is so performed. Can any of our correspondents throw some light on this subject.

J. S. V., of N. H.—There are no depths in the ocean to which a body originally heavier than sea water would not sink, although there is a theoretical limit where water would become so compressed as to be heavier than iron or even lead. This limit is, however, far lower than any depth of water supposed to exist in the ocean.

Wm. L. G., of D. C., wishes to know how to give small steel blades, which have been discolored by being ground, and which are not polished, a color which will remove or cover the rust, and also give a uniform shade of, say, blue or green.

S. K., of Ind.—We have not been able to get the definite information you seek in regard to the oil of brick.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notice exceed Four Lines, One Dollar and a Half per Line will be charged.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4·00 a year. Advertisements 17c. a line.

Parties in need of small Grey Iron Castings please address Enterprise Manufacturing Co., Philadelphia.

Excelsior Stump Puller & Rock Lifter. T.W.Fay, Camden, N.J.

For Sale—One half the interest in McGee's Patent Self-boring Faucet. Address T. Nugent, Morristown, N. J.

Knitting Machines.—Manufacturers will address R. Samuel, Walden, N. Y.

Ireland's Hand Fan Mover.—The Patent Right of this novel and valuable invention for sale for cash, or part cash, and a royalty. Address W. A. I., 4 Irving Place, New York.

For Sale—A very valuable Patent. Large Commission to Agents in selling my new and valuable invention. Address Peter Soule, Rochester, N. Y.

Stager's Automatic Boiler Feeder. For Rights and Machines apply to J. B. Smith, 417 Broadway, Milwaukee, Wis.

Double-barrel Breech-Loading Gun Manufacturers send circulars and Prices to F. Booker, Glass Box 196, Springfield, Ohio.

A Foreman Boiler Maker wishes a Situation to take charge of a Shop. Address "Boiler Foreman," care J. Kenworthy, 480 8th ave., N.Y.

Crampton's Imperial Laundry Soap, washes in hard or salt water, removes paint, tar, and grease spots, and, containing a large per centage of vegetable oil, is as agreeable as Castile soap for washing hands. "Grocers keep it." Office 84 Front st., New York.

Dickinson's Patent Shaped Carbon Points and adjustable holder for dressing emery wheels, grindstones, etc. See Scientific American, July 24th, and Nov. 20, 1869. 64 Nassau st., New York.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

Pattern Molding Letters to put on patterns of castings. Wholesale and retail, by H. W. Knight, Seneca Falls, N. Y.

Propeller Engine Cylinders, 28 inches square, for sale cheap, by Daniel W. Richards & Co., 92 Mangin st., New York.

Foundery Cranes, ten and fifteen tuns capacity, wanted. Address Box 2,348, Postoffice.

Foundery Cranes, thirty tuns capacity, for sale cheap. Address Postoffice Box 2,348.

Pictures for the Drawing Room.—Prang's "Lake George," "West Point," "Joy of Autumn," "Prairie Flowers." Just issued. Sold in all Art Stores.

Roofing Materials, House Sheathing, Roofing Felts, & Psints, full directions for applying. Mica Roofing Co., 73 Maiden Lane, New York.

Edging or Profiling Machines, having a valuable improvement in device for cutting "formers;" superior shaping, die sinking, spindle and cutter grinding machines are made by the Pratt & Whitney Company, Hartford, Conn.

A New Waltham Watch, made especially for Railroad Men and Engineers, is fully described in Howard & Co.'s Price List of Waltham Watches. Every one interested should send for a copy, which will be mailed to any address free. Address Howard & Co., 785 Broadway, N. Y.

Building Felt (no tar) for inside & out. C.J. Fay, Camden, N. J.

See advertisement of New Work on "Soluble Glass," published by L. & J. W. Feuchtwanger, 55 Cedar st., N.Y. Price $3·20, mailed free.

Pumping Water without Labor or Cost, for railroads, hotels, houses, cheese factories, stock fields, drainage, and irrigation by our self-regulating wind-mill. Strong and well tested. Con. Windmill Co., No. College Place, New York.

Screw Wrenches.—The Best Monkey Wrenches are made by Collins & Co. All Hardware dealers have them. Ask for Collins Wrench.

Profitable Canvassing.—"Universal Sharpener," for Table Cutlery and Scissors. A correctly beveled edge can be obtained. See Adv't.

Blind Stile Mortising and Boring Machine, for Car or House Blinds, fixed or rolling slats. Martin Buck, Agent, Lebanon, N. H.

Builders—See A. J. Bicknell's advertisement on outside page.

The best selected assortment of Patent Rights in the United States for sale by E. E. Roberts & Co., 15 Wall st., New York. See advertisement headed Patentees. Sales made on Commission.

Best Boiler-tube cleaner—A. H. & M. Morse, Franklin, Mass.

"Your $50 Foot Lathes are worth $75." Good news for all. At your door. Catalogues Free. N. H. Baldwin, Laconia, N. H.

The Best Hand Shears and Punches for metal work, as well as the latest improved lathes, and other machinists tools, from entirely new patterns, are manufactured by L. W. Pond, Worcester, Mass. Office, 98 Liberty st., New York.

One 60-Horse Locomotive Boiler, used 5 mos., $1,200. Machinery from two 500-tun propellers, and two Martin boilers very low. Wm. D. Andrews & Bro., 414 Water st., New York.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Keuffel & Esser, 116 Fulton st., N.Y., the best place to get 1st-class Drawing Materials, Swiss Instruments, and Rubber Triangles and Curves.

For tinmans' tools, presses, etc., apply to Mays & Bliss, Plymouth, st., near Adams st., Brooklyn, N. Y

Glynn's Anti-Incrustator for Steam Boiler—The only reliable preventative. No foaming, and does not attack metals of boiler. Liberal terms to Agents. C. D. Fredricks, 587 Broadway, New York.

Cold Rolled—Shafting, piston rods, pump rods, Collins pat. double compression couplings, manufactured by Jones & Laughlins, Pittsburgh, Pa.

For mining, wrecking, pumping, drainage, and irrigating machinery, see advertisement of Andrews' Patents in another column.

It saves its Cost every sixty days—Mitchell's Combination Cooking Stove. Send for circular. R. B. Mitchell, Chicago, Ill.

Incrustations prevented by Winans' Boiler Powder (11 Wall st. New York,) 15 years in use. Beware of frauds.

To ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's manufacturing news of the United States Terms $4·00 a year.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

PAINT MILL.—John W. Masury, Brooklyn, N. Y.—This invention relates to improvements in mills for grinding paint and other wet substances, and consists in providing the upper stationary stone with an annular or other hollow open or closed space for the application of cold or hot water or steam to be kept in circulation, for regulating the temperature of the stones and the substances being ground, which space is designed to be formed in the cast metal which is to be used with thin slabs of stones attached for the grinding surfaces. The invention also consists in a novel manner of suspending the upper stone on the frame for delivering the ground substance at several points around the stone, and in providing a plurality of scrapers for taking off the ground paint, so that three or more vessels may receive the ground substance at the same time, thereby enabling one person to attend to several mills, the vessels not filling so fast or needing to be changed so often; and also in a manner of suspending the upper stone for greater convenience in raising it off the bed stone.

GRAIN BINDER.—William Lottridge, Charles City, Iowa.—This invention relates to improvements in grain-binding attachments to reaping machines, and consists in a twisting attachment to the grain board of the harvester for forming a rope of straw to make the bands, the said rope being conducted over suitable guide rollers to the binding apparatus; also in an arrangement of binding jaws, twister, tucker, cutters, and the operating devices for the twister for swinging back and forth to open and close over a trough to which the gavel is delivered by a reel receiving the straw from an endless carrier, the said jaws opening to admit and disconnect the driving gear of the twister, and closing the gavel, to engage the twister with its driving gear and to bind the gavel. The invention also consists in certain improvements in the construction, arrangement, and operation of the rope carrier, tucker, discharger, cutters, and the grain holding and delivering reel.

NURSERY FOOTSTOOL.—Levi Burnell, Milwaukee, Wis.—This invention relates to improvements in footstools, and consists in a combination with a base plate preferably mounted on short legs of an upper plate hinged to it at or near one edge, or to a piece rising a little above it, and supported at the opposite edge by springs or other elastic support, considerably higher than the hinged edge, thereby constituting a graduated springing stool on which the nurse may place her foot while holding an infant, and trot it with an easy and uniform motion, not attainable when the feet rest on the floor.

HOISTING APPARATUS.—Levi Burnell, Milwaukee, Wis.—This invention relates to improvements in apparatus for hoisting building materials for building houses, and consists in a combination of a hoisting car, a track, and a counterpoise weight, so arranged that the counterpoise weight may be raised by the weight of the attendant on the unloaded car, and then raise the loaded car, whereby the gravity of the attendant may be used to raise loads as heavy, or heavier, than he could carry, in a manner much less fatiguing than the common way of carrying up the material in hods.

REED ORGAN.—George Woods, Cambridgeport, Mass.—This invention relates to improvements in reed organs, melodeons, and other like instruments, and consists in the application to the said instruments, as now constructed, of an additional wind chest, with reeds and sounding-box, for increasing and varying the sounds, the said attachment being so arranged that the valves may be worked by the keys which work the principle valves, and they may be brought into or out of action instantly by a stop provided for the purpose.

HEAD-BLOCK FOR SAW MILLS.—Franklin W. Shelley, Muncie, Ind.—This invention relates to a new apparatus for imparting motion to the head-blocks of circular and other saw mills. The invention consists chiefly in the application of a series of friction levers, which are operated by a pair of sliding bars so as to impart the necessary intermittant forward motion to the block.

ROOFING COMPOUND.—Joseph V. Douglas, Philadelphia, Pa.—This invention has for its object to utilize the iron scales, shavings, and dust which constitute the waste of shops, founderies, rolling mills, etc., and consists in combining the same with adhesive ingredients, to produce a coating or paint for roofs.

CORRUGATED AND METALLIC STREET PAVEMENT.—George Wilkes, New York city.—This invention has for its object the application of the railway principle to common use on street or roads so that all vehicles may have the smooth tracks which are now exclusively provided for railroad cars.

BALING PRESS.—William Iler, Shreveport, La.—This invention relates to a novel construction of mechanism for working the follower of a baling press, and consists in a new arrangement of friction clutches for working the follower downwardly, and also in a new construction of clutch.

VELOCIPEDE.—John Eggert, New York city.—This invention relates to improvements in the construction of the driving, steering, and braking gear of a three or four-wheeled velocipede, and to a new manner of supporting the seat on the same.

GRATE.—Francis Glick and U. Keck, Allentown, Pa.—This invention relates to a new sectional grate, which is so constructed that it can be dumped without disturbing or wearing its supports on the fireplace.

FENCE.—James Comstock, Greenfield, Ind.—This invention relates to improvements in fences, and consists in connecting the panels, which have broad posts attached to the ends, so that the longitudinal boards only extend to the centers, and are so arranged that at the meeting ends the parts of each panel will be on opposite sides to inclose the ends of both panels between them, by braces set on the ground and notched into the posts at the upper ends to support the whole above the ground, and tie bars, jointed at one end to the braces near the bottom, and extending through the board, by the edges of the posts, between the lower boards, and secured in blocks by keys in such a way that the weight of the fence serves to bind the whole together in a measure of permanence depending upon the weight of the fence.

HAIR CURLER.—J. W. Kenny and J. H. Adams, Albany, N. Y.—This invention relates to improvements in hair-curling instruments, and consists in making the cylinder hollow and of thin metal, with a small screw thread at the open end, and providing a heating iron with a handle for screwing into the said hollow curling cylinder or tube for heating the latter rapidly and uniformly, and providing a heat that will not burn the hair, by means of water contained in the tube into which the heating iron is placed. The invention also comprises the application to the tube of a thimble or ring for applying to the tube in a manner to confine the end of the lock of hair to be curled.

DEVICE FOR SPREADING CIRCULAR SAW TEETH.—W. H. Rudolph, Clarksville, Tenn.—The object of this invention is to facilitate the operation of spreading or expanding the points of circular saw teeth, so as to give a sharp cutting edge to the tooth and relieve the saw of friction, and it consists in a metallic plate provided with projecting ears for holding the tooth to be spread, and for holding the plate on the saw.

MANUFACTURE OF ICE.—J. F. Gesner, West Farms, N. Y.—This invention relates to improvements in the manufacture of ice and the refrigeration of air and all fluids, liquids, and solid substances which it may be desirable to reduce to a low temperature. By this improvement ice is produced or refrigeration obtained by the combined frigorific effect of the evaporation and heat conduction of liquid sulphurous anhydride or binoxide of sulphur (ordinarily called sulphurous acid), chemical symbol SO_2, containing one equivalent of sulphur and two equivalents of oxygen.

HORSE POWER.—E. O. and C. B. Thompson, Thomasville, Ga.—This invention relates to improvements in horse power, and consists in an improved arrangement of the supporting frame and operating machinery calculated to provide a simple and cheap apparatus for use either on the floor or for attachment, so as to be suspended in an inverted position from the beams or frame of a gin house or other building.

© 1870 SCIENTIFIC AMERICAN, INC.

CAR PUSHER.—Rufus Lane, Freeport, Ill.—This invention relates to a new improvement for propelling railroad cars on switches, etc., in places where engines for that purpose are not to be obtained. The invention consists in the use of an extension frame which has a claw for propelling the rail at one end and a pushing block at the other, and can be extended by revolving a pinion.

ELASTIC CLASP.—Antoine Scheydecker, Amsterdam, N. Y.—This invention has for its object to furnish an improved clasp for confining the ends of elastic sleeve bands and other elastic bands, which shall be so constructed as to hold the end of the bands securely, and at the same time in such a way as to prevent the clasp from coming in contact with the sleeve or other object about which the band is passed.

CORN PLANTER.—H. C. Beshler, Berrysburgh, Pa.—This invention has for its object to furnish an improved corn planter, which shall be so constructed and arranged as to drop the corn uniformly and at the proper time, and in such a way that the operator may see the kernels as they pass down the onductor spouts.

CHECK REIN CONNECTOR.—A. H. Rockwell, Harpersville, N. Y.—This invention has for its object to furnish a simple, convenient, and effective device for connecting the check rein with the main rein, which shall be so constructed as to enable the check rein to be secured to the main rein adjustably without sewing, forming holes in, or otherwise weakening the said main rein.

CAR COUPLING.—G. W. Wheat, Philipsburg, Pa.—This invention has for its object to furnish an improved car coupling which shall be simple in construction, effective in operation, will couple the cars automatically when they are run together, and may be easily and conveniently uncoupled.

ELASTIC CABLE APPARATUS.—J. E. Jones, Wiretown, N. J.—The object of this invention is to provide means for giving elasticity to chain cables on board of ships and steamboats, designed for relieving the cable in breaking the anchor from the ground, and in the surging of the vessel.

GUANO DISTRIBUTOR.—William E. Martin, Oconee, Ga.—This invention has for its object to furnish a simple, convenient, and effective machine for distributing guano, and other fine fertilizers, which shall be so constructed and arranged that it may be easily operated by hand.

ADJUSTABLE TIME TABLE.—Loyst J. Smith, New York city.—This invention relates to a new time-table for railroads, steamboats, and other purposes, and consists principally in the employment of a series of reversible and removable blocks upon which the requisite figures or characters are written, the blocks being retained by means of removable slides.

HARROW.—Andrew Lewis, Hastings, Minn.—This invention has for its object to furnish an improved harrow, which shall be flexible, so as to adapt itself to any unevenness of ground, and which may be folded together to enable it to make a turn on short corners.

PROJECTILES.—James G. Hope, Topeka, Kan.—This invention has for its object to furnish an improvement in balls and other projectiles, by means of which the ball or other projectile may be fired in curved lines with the same accuracy as in straight lines.

BOAT HULLS.—L. P. Rider, Pittsburgh, Pa.—This invention relates to a new and important improvement in mode of constructing boats or marine vessels, and consists in the application of certain construction lines for forming the bottom of the hull, by means of which the water is made to exert a lifting force on the boat, and is thrown beneath instead of to the opposite sides of the boat.

HAND GUANO-DISTRIBUTER.—Edwin R. Stedman, Sparta, Ga.—This invention relates to improvements in apparatus for sowing guano, plaster, and other like substances in the rows or drills in which the seed is planted. It consists in a small tin or other sheet metal cup, with a short socketed or other suitable handle for the reception of a longer wooden one, and having a hole at the apex of the conical bottoms, over which works a slide for regulating the discharges, said slide being held by a pin, or it may be any other fastening, engaging it at certain prearranged points by which it holds the slide at certain graduated positions for discharging the required quantities.

SNAP HOOKS.—David J. Blasir, Western, N. Y.—This invention relates to improvements in the construction of snap hooks, and mode of attaching the reins thereto, and consists in making the shank of the hook, which is broad and flat, and broader at the end than at the junction with the hooks, and providing a clasp corresponding to it for slipping on in the direction of the strain on the rein, which clasp confines the end of the rein against the side of the shank, upon rivets projecting from it, and also confines the snap springs in a way to admit of readily removing it and applying another when broken or rendered useless from any cause.

SAW SET.—Wm. A. Smith, Dresserville, N. Y.—This invention relates to an improved saw set, which is adapted for setting the teeth of crosscut saws, by driving a tool, resembling in some respects the common upsetting tool used, for spreading the teeth of saws cutting with the grain of the wood, against the points of the teeth.

STUMP PULLER.—J. M. Ferguson, Summit, Miss.—This invention relates to improvements in machines for pulling stumps, and consists in an arrangement on the top of a portable frame of a spherical nut, with a pulling screw rod working in it, the said nut being mounted in a rotating sweep to be turned for raising the screw rod, and to have a universal motion in its seat in the sweep, so that the rod may shift according to the direction of the strain on it, and the sweep being mounted on friction balls for being supported and for revolving readily. The invention also comprises an arrangement of the brace rods for the base of the frame, calculated to facilitate the adjustment of the frame around the stumps.

MACHINE FOR FINISHING WHEELS.—Jas. L. Hathaway, Norfolk Va.—This invention relates to improvements in machinery for dressing and finishing small gear and other wheels for watches and the like, and consists in a rotary cutter of peculiar construction, and a wheel support, arranged for turning the faces of the wheels, also for dressing out and finishing the teeth.

OPERATING SAFETY LATCHES.—J. Ward Fifield, Franklin, N. H.—This invention relates to a new and useful improvement in operating safety latches, whereby the latch may be moved for locking or unlocking by means of a key.

GAS MACHINE.—John L. Bartlett, Stockton, Cal.—This invention relates to a new and useful improvement in machines for generating illuminating gas by carbureting atmospheric air.

CAR COUPLING.—Loyst J. Smith, New York city.—This invention relates to a new car coupling, which is made entirely self-acting, so that it will connect two cars without the aid of an attendant.

MEDICAL COMPOUND.—H. W. Cloud, Evansville, Ind.—This invention relates to a new and useful improvement in a compound to be used as a medicine for the cure of disease, and as a tonic.

SWING LOCK FOR TRUNKS.—James Terry, Jr., Terryville, Conn.—This invention relates to a new construction of lock fastening for trunks, etc., and more particularly to a novel form of joint for a swinging lock.

COMPOSITION ROOFING.—George Shove, Yarmouth Port, Mass.—This invention relates to a new composition for roofing, or, rather, to a novel combination of materials for constructing a covering for roofs.

POTATO DIGGER.—G. M. Marks, Half Moon, Pa.—This invention relates to new and useful improvements in a machine for digging potatoes, whereby that tedious and laborious operation is performed by horse-power, and in the most expeditious manner.

TELESCOPIC PEN AND PENCIL CASES.—Charles H. Downes, Jersey city, N. J.—This invention relates to improvements in telescopic pen and pencil cases, of that class wherein the pen or pencil holders are moved out and in the sheaths, or outer cases, by means of spirally slotted tubes, and it consists in a novel arrangement of the revolving tube and its adjuncts, whereby the spindles or pencil holders may be made of greater capacity with the cases of ordinary or a given capaci

HOISTING GRAPPLE.—John A. Burgess, Plymouth, Mass.—The object of this invention is to facilitate the operation of hoisting barrels containing fish, or other material or substance, having but one head, designed more especially for use on fishing vessels, for hoisting and lowering fish (which are usually packed in open barrels), into the holds of the vessels.

WAGON BEDS.—W. H. Porter, Brazil, Ind.—This invention relates to improvements in wagon beds, platforms, or boxes, and consists in certain improvements in the construction and arrangements thereof, and of the connections of the brake, actuating levers, calculated to provide the most substantial and durable boxes or beds and brake apparatus that may be.

SAW FILING AND SETTING MACHINE.—Hiram D. Chance and Daniel Rishe, Llewellyn, Pa.—This invention relates to improvements in saw-filing and setting machines, and consists in an application to a pair of clamping jaws such as are used for clamping the saw and holding it to the bench, of a novel arrangement of file-holding and adjusting apparatus; also, of a setting lever.

FURNACE GRATE.—Abner B. Weeks, Rockland, Me.—This invention relates to improvements in grates of furnaces of steam-generating or other apparatus, which burn large quantities of fuel, and consists in a simple and convenient arrangement of the same in sections for dumping while the fires are burning, to discharge the refuse matter.

WATER METER.—John W. Groat, New York city.—This invention relates to improvements in the construction of that class of water meters in which the water is made to pass over a screw or spiral blade incased in a tube, the blade or screw being turned by the water, and the shaft thereof imparting motion to the recording apparatus. The invention consists in the construction of the case and the blade, and in the relative arrangement of the one with the other; also in the construction of the tube inclosing the spiral blade.

WATER CLOSET.—S. R. Mann, East Cowes, England.—This invention relates to an improvement in water closets, and consists in an arrangement of parts connecting to the bottom or lower part of the pan or basin a siphon pipe, the long leg of which connects with the soil pipe, or with a trap which leads to the drain or sewer. The action of the closet is as follows: Before the handle is pulled the basin contains its normal quantity of water, say one third of a gallon, which, while serving for the proper reception of foul matters, at the same time seals the communication between the basin and the siphon pipe, which leads to the drain. When the handle is pulled, a quantity of water, say half a gallon, is quickly discharged into the basin, and the impulse and effect thus produced cause the water to flow up the short leg of the siphon and over its top bend, falling down its longer leg, and driving forward the air, or a portion of the air, contained therein, and in passing through or out of the bottom of the longer leg the water is checked in its flow, and the siphon is brought into or continued in action, drawing the contents of the basin forward so as to pass on into the soil pipe trap or drain, without allowing foul air to escape backwards into the basin or apartment.

BREECH-LOADER.—F. Von Martini, Lauenfeld, Switzerland.—This invention dispenses with the spiral spring at present employed for actuating the discharging mechanism in the Martini rifle, and the separate functions of the same and other springs heretofore usually employed in fire-arms of the kind above referred to are fulfilled by a single flat bent spring. This flat, bent spring is placed in the lock frame behind a direct-acting or other hammer, the upper part or band of the spring partly supports the rear part of the falling breech block, a recess in the block resting on the bend of the spring. The lower parts of the spring are used for actuating the tumbler or hammer to discharge the arm, and also as a trigger or sear spring.

THE Newark *Daily Journal* says: "We have a great idea of New Jersey as THE (or, at least, A) nursery of inventors, and though a certain New England State puts in a claim, we believe (and probably a just one), to be considered as the great mother of inventors in this hemisphere, we nevertheless cannot get rid of the notion that among the Jersey Blues what may be called the genuine spirit of invention prevails to a very uncommon degree. There is scarcely a village, indeed, of any account, so far as the mechanic arts are concerned, in this comparatively small but independent State, where two or three of its denizens are not to be met with whose ingenious experiments justly entitle them to the legitimate distinction of being (in however small a measure) the benefactors of their species; nay, whose powers of discovery, could the latter be effectually brought into practice, may have the effect of revolutionizing to advantage many a branch of mechanical business at present sinking into desuetude for the lack of such regeneration. Well, what is it, it may be asked, that could, under the circumstances, be done to bring about so great a *desideratum*? We answer that every well-wisher to the struggling inventor—every one with the means and the will—should take part in bringing such inventor, if he cannot do it himself, in immediate contact with those that can help him, and that effectually. And who are they? We answer, none other than that long-established, universally-known, deeply-experienced, and, by all odds, the most thoroughly skillful firm at present to be met with in this country, as procurers of patents—we mean, as a matter of course, Messrs. Munn & Co., of the *Scientific American*, 37 Park Row, New York city, who, if anybody can, CAN most effectually benefit any inventor deserving the name, and whose object it may be to secure a patent for his invention."

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING Oct. 4, 1870.

Reported Officially for the Scientific American.

SCHEDULE OF PATENT OFFICE FEES.

On each caveat	$10
On filing each application for a Patent (seventeen years)	$ 5
On issuing each original Patent	$20
On Appeal to Examiner-in-Chief	$10
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$
On filing a Disclaimer	$ 0
On an application for Design (three and a half years)	$ 0
On an application for Design (seven years)	$15
On an application for Design (fourteen years)	$30

For copy of Claim of any Patent issued within 30 years $1
A sketch from the model or drawing, relating to such portion of a machine as the Claim covers, from $1
upward, but usually at the price above-named.
The full Specification of any patent issued since Nov. 20, 1866, at which time the Patent Office commenced printing them ..... $1·25
Official Copies of Drawings of any patent issued since 1836, we can supply at a reasonable cost, the price depending upon the amount of labor involved and the number of views.
Full information, as to price of drawings, in each case, may be had by addressing

MUNN & CO.,
Patent Solicitors, No. 37 Park Row, New York.

107,849.—COOKING RANGE.—James Albee, Chelsea, assignor to Moses Pond & Co., Boston, Mass.
107,850.—FEED-WATER HEATER.—Harrison Anderson, Peoria, Ill.
107,851.—PAPER-FEEDING APPARATUS.—John T. Ashley, Brooklyn, E.D., N. Y.
107,852.—DIAPHRAGM STOPCOCK.—W. E. Banta, Springfield, Ohio.
107,853.—GAS CARBURETER.—John L. Bartlett, Stockton, assignor for one half his right to William Biven, San Joaquin county, Cal.
107,854.—PROCESS FOR SEASONING LUMBER.—H. H. Beach, Rome, N. Y.
107,855.—HANDLE FOR MILK CAN.—Alvin C. Beckwith and G. H. Graham, Oriskany, N. Y.
107,856.—GRAIN SEPARATOR.—Frederick A. Begole, Jackson, Mich.
107,857.—CORN PLANTER.—Henry C. Beshler, Berrysburg, Pa.
107,858.—ROLL FOR CRUSHING AND PULVERIZING MACHINE.—S. S. Blake, Pittsburgh, Pa.
107,859.—SNAP HOOK.—D. J. Blasir, Western, N. Y.
107,860.—GRAIN AND SEED CLEANER.—Newton M. Bowen, Knightstown, Ind.
107,861.—CIRCULAR SAW MILL.—Wm. Bowman, Etna Green, Ind.
107,862.—COMBINED PLOW AND HARROW.—J. F. Braucher Lincoln, Ill.
107,863.—SLIDE VALVE.—George Bailey Brayton, Boston, Mass.
107,864.—MANUFACTURE OF BOOTS AND SHOES.—William N. Brookhouse, West Danvers, Mass.
107,865.—REED-SETTING MACHINE.—Joseph Browning, Philadelphia, Pa.
107,866.—MANUFACTURE OF SALT.—J. R. Buchanan, Louisville, Ky.
107,867.—CASTING VALVE CHAMBER AND SEAT.—John K Burke, Rochester, N. Y.
107,868.—HOISTING APPARATUS.—Levi Burnell, Milwaukee, Wis.
107,869.—NURSERY FOOTSTOOL.—Levi Burnell, Milwaukee, Wis.
107,870.—HOSE BRIDGE.—Walter E. Cameron, Taunton, Mass.
107,871.—WRENCH.—Daniel Campbell and William Saul, Elizabeth, N. J.
107,872.—SAW-FILING AND SETTING MACHINE.—Hiram D Chance and Daniel Rishe, Llewellyn, Pa.
107,873.—VISE.—Julius Chavanne, Porrentray, Switzerland.
107,874.—STOVE LEG.—S. E. Chubbuck (assignor to himself, Isaac Y. Chubbuck, and Stillman E. Chubbuck, Jr., copartners, Boston, Mass.
107,875.—MACHINE FOR DRILLING CARRIAGE SHACKLES.—J. B. Clark, Plantsville, Conn.
107,876.—RANGE FOR HEATING AND COOKING.—J. S. Clark, Philadelphia, Pa.
107,877.—MEDICAL COMPOUND.—H. W. Cloud, Evansville, Ind.
107,878.—MANUFACTURE OF FERTILIZERS.—John Commins, Charleston, S. C.
107,879.—FENCE.—James Comstock (assignor to himself and John W. Comstock), Greenfield, Ind.
107,880.—WATER COOLER AND REFRIGERATOR.—Levi R. Comstock, Keokuk, Iowa.
107,881.—PARLOR BEDSTEAD.—Mark Crosby, Boston, Mass.
107,882.—ROULETTE.—A. H. Crozier, Oswego, N. Y., and M. Taylor, Hartford, Conn.
107,883.—PORTABLE FENCE.—Wells Crumb, Coloma, Mich.
107,884.—STREET LAMP.—Gustavus Cuppers, New York city. Antedated September 21, 1870.
107,885.—BARREL HEAD.—Reuben De Bare, Philadelphia Pa.
107,886.—SAW MILL.—J. A. Dorr, Williamsport, Pa.
107,887.—MACHINE FOR FELTING AND HARDENING HAT BODIES.—John T. Earle, Danbury, Conn.
107,888.—VELOCIPEDE.—John Eggert, New York city.
107,889.—HEMMER FOR SEWING MACHINES.—John V. D. Elvidge, Detroit, Mich.
107,890.—WEIGHING ATTACHMENT FOR CARDING MACHINE FEEDER.—P. C. Evans, Brimscombe, England, and H. J. H. King, Glasgow, Scotland.
107,891.—STEAM PULLER.—James M. Ferguson, Summit, Miss.
107,892.—LUMBER DRYER.—Robert E. Ferguson, Chicago, Ill.
107,893.—CLOTHES WRINGER.—Robert E. Ferguson, Chicago, Ill.
107,894.—KNIFE-GRINDING MACHINE.—E. S. M. Fernald, Saco, Me.
107,895.—SAFETY LATCH.—J. W. Fifield, Franklin, N. H.
107,896.—MACHINE FOR POLISHING THE EYES OF SEWING MACHINE NEEDLES.—Thaddeus Fowler, Tottenville, N. Y., assignor to "Excelsior Needle Co.," Wolcottville, Conn.
107,897.—MOP HEAD.—O. S. Garretson and J. G. Garretson Buffalo, N. Y.
107,898.—MANUFACTURE OF ICE.—J. F. Gesner, West Farms, N. Y.
107,899.—GRATE.—Francis Glick and Uriah Keck, Allentown, Pa.
107,900.—WATER METER.—John Warner Groat, New York city.
107,901.—MACHINE FOR MAKING CLEVIS.—John S. Hall, Pittsburgh, Pa.
107,902.—ADJUSTABLE WINDOW SHADE.—E. W. Hastings, Boston, Mass.
107,903.—MACHINE FOR FINISHING WHEELS FOR WATCHES.—J. L. Hathaway, Norfolk, Va.
107,904.—PRESERVING WOOD.—Joshua R. Hayes, Washington, D. C.
107,905.—HORSE-COLLAR TOP.—Isaac Hicks (assignor to himself and J. O. Kendall), Hartford, Wis.
107,906.—STUMP EXTRACTOR.—Johnson Higgins, Friendship, N. Y.
107,907.—NECKTIE.—John G. Hitchcock, New York city.
107,908.—CORN PLANTER.—Hezekiah R. Holland, Wilmington, Va.
107,909.—PROJECTILE.—J. G. Hope, Topeka, Kansas.
107,910.—CEMENT FOR PAVING AND BUILDING.—J. E. Hover, Philadelphia, Pa.
107,911.—MACHINE FOR TENONING SPOKES.—John W. Huffman, Fremont, Ind.
107,912. LIFE BOAT.—Robert Humble, Milwaukee, Wis.
107,913.—MACHINE FOR MAKING FANSTICK.—Edmund S. Hunt, Weymouth, Mass.
107,914.—WAGON LOCK.—S. S. Hurlbut, Cardova, Ill.
107,915.—GRAIN DRILL.—Joseph Ingels, Milton, Ind.
107,916.—MAINSPRING BARREL OF WATCH.—H. B. James, Trenton, N. J.
107,917.—SURGE RELIEVER.—J. E. Jones, Wiretown, N. J.
107,918.—MACHINE FOR TURNING OR PLANING THE INSIDE OF BELL OR OTHER CASTING.—Octavous Jones, Troy, N. Y.
107,919.—CORN SHELLER.—Elbert Jordan, Pickens County, Ala.
107,920.—HAIR CURLER.—J. W. Kenny and J. H. Adams, Albany, N. Y.
107,921.—TREADLE FOR SEWING AND OTHER MACHINERY.—G. B. Kirkham, New York city.
107,922.—COTTON OPENER.—Richard Kitson, Lowell, Mass.
107,923.—BARK MILL.—Charles Korn, Wurtsborough, N. Y.
107,924.—ROCKING OR TILTING CHAIR.—James Lamb, Hubbardston, Mass.
107,925.—MOLD-BOARD FOR PLOW.—John Lane (assignor to Hapgood & Co.), Chicago, Ill.
107,926.—CAR PUSHER.—Rufus Lane (assignor of one half his right to W. G. Moore), Freeport, Ill.
107,927.—CIGAR MACHINE.—Johan Lauritzen, Newark, N. J
107,928.—HOT AIR ENGINE.—C. P. Leavitt, New York city.
107,929.—HAMMER STRAP.—W. J. Lewis, Pittsburg, Pa.
107,930.—RACK FOR WAGON BRAKE.—W. J. Lewis, Pittsburgh, Pa.
107,931.—BLANK FOR HAMMER-STRAP FOR WAGONS.—W. J Lewis, Pittsburg, Pa.
107,932.—MEAT AND VEGETABLE SLICER.—P. H. Lindsey, Lockport, N. Y.
107,933.—GRAIN BINDER.—William Lottridge, Charles City, Iowa.
107,934.—WATER INDICATOR AND ALARM.—Mirabeau, New Albany, Ill.
107,935.—FLOUR BOLT.—John Mallin, Chicago, Ill.
107,936.—WATER CUT-OFF FOR CISTERNS.—J. R. Manny, Chicago, Ill.
107,937.—GUANO DISTRIBUTER.—W. E. Martin (assignor to James D. Barber), Oconee, Ga.
107,938.—SULKY PLOW.—H. W. Mason, Hagarstown, Md.
107,939.—PAINT MILL.—J. W. Masury, Brooklyn, N. Y.
107,940.—IRONING TABLE.—Henry McChesney (assignor to himself and J. W. Clark), Buffalo, N. Y.
107,941.—STAIR ROD.—W. T. Mersereau, Orange, N. J.
107,942.—MANUFACTURE OF PURIFIED CAST IRON FROM THE ORE.—J. W. Middleton, Philadelphia, Pa. Antedated September 24 1870.
107,943.—CUTTER HEAD FOR PLANER.—John More, New York city.
107,944.—FEATHER RENOVATOR.—M K Morris Council Bluffs, Iowa.

© 1870 SCIENTIFIC AMERICAN, INC.

107,945.—BALANCED SLIDE VALVE.—G. F. Morse, Portland, Me.
107,946.—EXPANDING TAP.—Frank Murgatroyd, Cleveland, Ohio.
107,947.—PIANO LOCK.—John Murphy, Roslindale, assignor to O. J. Faxton, Boston, Mass.
107,948.—DAMPER REGULATOR.—J. H. Murrill (assignor to himself and L. R. Keizer), Baltimore, Md.
107,949.—ICE CREAM PAIL.—G. A. Nash, Niles, Mich.
107,950.—RAILWAY CAR COUPLING.—Nathan Norris, Buchanan, Mich.
107,951.—APPARATUS FOR DRAWING AND MEASURING OIL.—Person Noyes, Lowell, Mass.
107,952.—TIE FOR BAGS, GRAIN, ETC.—G. W. Osborn, Parkville, Mich.
107,953.—WIRE.—J. S. Parsons, Windham, assignor to himself and A. S. Winchester, South Windham, Conn.
107,954.—CULTIVATOR.—H. N. Pease, Toledo, Ohio.
107,955.—FRICTION ROLLER FOR RAILWAY CAR TRUCKS.—Jethro Pencille, Lockport, N. Y., assignor to himself and Cornelius Hood.
107,956.—CURTAIN FIXTURE.—F. G. Peoble, New York city. Antedated September 10, 1870.
107,957.—APPARATUS FOR WASHING ORES AND MINERALS.—Edwin Platt, Charleston, S. C.
107,958.—MACHINE FOR WASHING ORES AND OTHER MINERAL SUBSTANCES.—J. B. Platt, Augusta, Ga.
107,959.—WASHING MACHINE.—C. M. Powers and T. L. Robinson, Flushing, N. Y.
107,960.—TREE AND PLANT PROTECTOR.—D. R. Prindle, East Bethany, N. Y.
107,961.—HULL OF VESSELS.—L. P. Rider (assignor to himself, William Yagle, and A. Ward), Pittsburgh, Pa.
107,962.—MANUFACTURE OF ICE.—Moritz Rosenstein, Boston, Mass.
107,963.—DEVICE FOR SPREADING CIRCULAR SAW TEETH.—W. H. Rudolph, Clarksville, Tenn.
107,964.—HAND STAMP.—H. W. Safford, New York city.
107,965.—LINK CONNECTING THE HANDLES AND VALVE-RODS OF PUMPS.—Samuel Selden and Matthew Griswold, Erie, Pa.
107,966.—HEAD BLOCK FOR SAW MILL.—F. W. Shelley, Muncie, Ind.
107,967.—ROOFING.—George Shove, Yarmouth Port, Mass.
107,968.—TEMPORARY PAPER BINDER.—F. M. Smith, Syracuse, N. Y.
107,969.—READING GLASS.—J. H. Smith, Brooklyn, E. D., N. Y.
107,970.—ADJUSTABLE TIME TABLE.—L. J. Smith (assignor to himself and H. D. Blake), New York city.
107,971.—CAR COUPLING.—L. J. Smith (assignor to himself and H. D. Blake), New York city.
107,972.—CORN HARVESTER.—M. A. Smith, Middlefield, N. Y.
107,973.—PLOW.—C. W. Snead, Milledgeville, Ga.
107,974.—DEVICE FOR ATTACHING STEELS TO CORSETS.—W. A. Starrett and H. E. Starrett, Lawrence, Kansas. Antedated September 24, 1870.
107,975.—GUANO DISTRIBUTER.—E. R. Stedman, Sparta, Ga.
107,976.—CONSTRUCTION OF STEAM BOILERS AND TANKS.—H. J. Stein, Hannibal, Mo.
107,977.—STEAM PUMP.—C. L. Stevens, Galesburg, Ill., assignor to himself, A. A. Dentan, and D. G. Dentan. Antedated September 26, 1870.
107,978.—SHAFT COUPLING.—Timothy F. Taft, Worcester, Mass., assignor to Aurin Wood and J. F. Light.
107,979.—MECHANISM FOR OPERATING COMBER BOARDS.—J. S. Templeton, Glasgow, Great Britain.
107,980.—GRAIN AND SEED DRILL.—G. M. Thirkittle, Belleville, Mich.
107,981.—MACHINE FOR LASTING SHOES.—C. H. Trask, Lynn, Mass.
107,982.—DRYER.—Edmund Trowbridge and Jas. M. Jones, Detroit, Mich.
107,983.—LOCOMOTIVE.—J. M. Ure, Glasgow, Great Britain. Patented in England March 18, 1868.
107,984.—ROTARY BAKE OVEN.—Joseph Vale, Beloit, Wis.
107,985.—GRINDER FOR HARVESTER CUTTER.—S. O. Vaughan, and P. W. Vaughan, DeKalb, Ill.
107,986.—THRASHER AND SEPARATOR.—Albert A. Walker (assignor to W. C. Leyburn, and G. A. Fisk), Sparta, Wis.
107,987.—FURNACE GRATE.—Abner B. Weeks, Rockland, Me.
107,988.—RAILWAY CAR COUPLING.—G. W. Wheat, Philipsburg, Pa.
107,989.—CORRUGATED METALLIC PAVEMENT.—Geo. Wilkes, New York city.
107,990.—COMBINED HORSE-POWER AND BALING PRESS.—C. A. Wright, Rodney, Miss.
107,991.—WASHING MACHINE.—George Wright, Savannah, Mo.
107,992.—TYPE PLANER.—Walter Sumner Wright, Chicago, Ill.
107,993.—ELECTRO-MAGNETIC SAFE LOCK.—Charles O. Yale, New York city. Antedated September 24, 1870.
107,994.—THRASHING MACHINE.—Joseph Allonas, Mansfield, Ohio.
107,995.—SPRING BED.—Lewis Anderson, Chicago, Ill.
107,996.—CLOTHES RACK.—Herman Baumann and Urban Mueller, Canton, Ohio.
107,997.—COMPOUND FOR COLORING PAPER AND OTHER FABRICS.—Frederick Beck, New York city.
107,998.—NUT LOCK.—Jonathan Bell, New York city.
107,999.—FEATHER RENOVATOR.—Elias Bickell and Michael F. Noraconk, Milton, Pa.
108,000.—AUXILIARY TABLE ATTACHMENT.—James Blake, Scranton, Pa.
108,001.—RADIATOR.—Edward Bourne, Pittsburgh, Pa.
108,002.—SUBSOIL PULVERIZING ATTACHMENT FOR PLOW.—L. D. Burdin, Paris, Ky.
108,003.—KNITTING MACHINE.—W. W. Burson and John Nelson, Rockford, Ill. Antedated Sept. 30, 1870.
108,004.—PLOW.—Manlove Butler, Vernon, Ind.
108,005.—APPARATUS FOR CARBURETING AIR AND GAS.—Henry A. Chapin, New York city.
108,006.—LIFE PRESERVER.—E. M. Crandal, Marshalltown, Iowa. Antedated September 26, 1870.
108,007.—VEGETABLE CUTTER.—Francis Curtis, Brattleborough, Vt.
108,008.—CLOTHES DRYER.—W. A. Daggett, Landis township, N. J.
108,009.—GAS RETORT.—Darius Davison, New York city.
108,010.—CLAPBOARD GAGE.—Abram Deyo, Rockford, Ill.
108,011.—SAW.—Henry Disston, Philadelphia, Pa.
108,012.—BRICK MACHINE.—D. P. Dobbins and James Sangster, Buffalo, N. Y.
108,013.—MACHINE FOR MILLING CARRIAGE-SPRING HEADS.—William Evans, New Haven, Conn.
108,014.—FLUE.—Nelson Fouche, New Orleans, La.
108,015.—MACHINE FOR SCRAPING CHAIR-BACKS.—Erastus S. French, Westminster, Mass.
108,016.—ROTARY ENGINE.—Samuel Gibson, Lancaster, assignor to himself and I. W. G. Wierman, York, Pa.
108,017.—BOLT FOR BARN-DOORS, ETC.—M. R. Green, Warwick, N. Y.
108,018.—BED BOTTOM.—Benjamin Gregg, Bennington, Vt.
108,019.—WASHING MACHINE.—Luke Hale, Hollis, N. H.
108,020.—SEWING MACHINE.—Thomas J. Harper, Atlanta, Ga.
108,021.—MEAT MANGLER.—James T. Harvey and William Dixon, Marysville, Pa.
108,022.—REVOLVING FIRE-CRACKER PISTOL.—J. H. Hawes and Orville W. Brock, Monroeton, Pa., assignors to J. H. Hawes.
108,023.—TRIP-HAMMER AND ANVIL STOCK.—J. C. Higgins, Skowhegan, Me.
108,024.—SNAP HOOK.—Asahel A. Hotchkiss, Sharon, Conn.
108,025.—BEER FAUCET.—Christian Jakob, New Orleans, La.
108,026.—MOLDING CUTTER.—Nicholas Jenkins, New York city.
108,027.—PANELING MACHINE.—Nicholas Jenkins, New York city. Antedated September 24, 1870.
108,028.—TOY TORPEDO.—T. J. Johnson (assignor to H. P. Diehl & Co.), Cincinnati, Ohio.
108,029.—GAS REGULATOR.—Peter Keller, New York city.
108,030.—COMPOSITION FOR DESTROYING WORMS IN FRUIT TREES.—Solomon Kepner, Pottstown, Pa.
108,031.—GATE.—Solomon Kepner, Pottstown, Pa.
108,032.—PLOW AND PLANTER.—Peter Kling, Springfield, Ill.
108,033.—SEWING MACHINE.—Albert Komp, New York city.
108,034.—PUTTING UP MEDICINE.—Frederic Kraus, Cincinnati, Ohio.
108,035.—CHURN.—Alexander Ladd, St. Lawrence, N. Y.
108,036.—HOMINY-MILL.—John K. Leedy, Maurertown, Va.
108,037.—CULTIVATOR.—James R. Little, Galesburg, Ill.
108,038.—ADDRESSING MACHINE.—James McFatrick, Lena, Ill.
108,039.—BUSTLE.—Donald McInroy, Brooklyn, E. D., N. Y.
108,040.—SAW.—W. F. Milliman (assignor to Henry Disston & Son,) Philadelphia, Pa.
108,041.—ELECTRO-PHOTO DAMASKENING AND ENAMELING. A. G. Morvan, New York city.
108,042.—METAL PLATE OF IRON AND STEEL.—Jas. Myers, Jr., Williamsburgh, N. Y.
108,043.—CUSHION, MATTRESS, ETC.—T. H. O'Brien, Providence, R. I.
108,044.—CORN PLANTER AND MARKER.—Floyd Ogden, Fisherville, Ky., assignor to himself and J. T. Rose, Utica, Ind.
108,045.—MILLSTONE BUSH AND BEARING.—Andrew Ortlip, East Vincent, Pa.
108,046.—SHOW STAND.—Joseph R. Palmenberg, New York city.
108,047.—SHOVEL PLOW.—P. B. Parcell, Ashmore, Ill.
108,048.—FRUIT DRYER.—Oliver P. Pence, Des Moines, Iowa.
108,049.—FANNING MILL.—Christian Peterson, Red Wing, Minn.
108,050.—WATER HEATER.—Jas. Raisbeck and T. A. Raisbeck, New York city.
108,051.—SEED PLANTER.—Blachman A. Ramsey, Trenton, Tenn.
108,052.—SHUTTER FASTENER.—Andrew Rankin, Philadelphia, Pa.
108,053.—WHEELBARROW.—R. M. Reynolds, East Saginaw, Mich.
108,054.—WASHING MACHINE.—Abner Riggs, Frostburg, Md.
108,055.—COMPOSITION FOR COVERING STEAM BOILERS, AND OTHER PURPOSES.—John Riley, Troy, N.Y., assignor to the United States and Foreign Salamander Felting Co.
108,056.—FIELD ROLLER AND FURROWING MACHINE.—M. M. Robbins, Centerville, Ind.
108,057.—LAND ROLLER.—I. W. Searles, Tiffin, Ohio.
108,058.—MANUFACTURE OF IRON AND STEEL.—Larenzo Sibert, Staunton, Va. Antedated Sept. 24, 1870.
108,059.—SAW.—John Smith (assignor to Henry Disston and Hamilton Disston), Philadelphia, Pa.
108,060.—TANNING VAT.—J. E. Smith and C. L. Smith, South Dedham, Mass.
108,061.—EARTHEN TEAPOT.—Thomas Smith, Jr., Boston, Mass.
108,062.—SHAFT COUPLING FOR VEHICLE.—John Steele, Sheldon, Ill.
108,063.—BUTTON HOOK AND HANDKERCHIEF HOLDER COMBINED.—G. D. Stevens, New York city.
108,064.—LANTERN.—Peter Sweeney, New York city.
108,065.—CORN PLANTER.—Nathan Swigart, Richfield, Ohio.
108,066.—TONGS FOR FORGING THE ARMS ON FIFTH WHEELS.—Wales Terrell, Ansonia, Conn.
108,067.—METALLIC BINDING FOR TEXTILE FABRICS.—Jas. Twamley, New York city.
108,068.—TILES FOR ROOFING, ETC.—William Utley, Troy, N. Y.
108,069.—HARVESTER.—A. H. Wagner, Chicago, Ill.
108,070.—SAUSAGE STUFFER.—Henry Whaler, Henry Metz, and Ludwig Heinzle, Freeport, Ill.
108,071.—CAP FOR HORSE COLLAR.—J. F. Walsh, Hazel Green, Wis.
108,072.—RENDERING LEATHER IMPERVIOUS TO HYDROCARBON LIQUIDS.—Albin Warth, Stapleton, N. Y.
108,073.—LETTER BOX.—E. C. Weld (assignor to himself and T. C. Glazier), New York city.
108,074.—SEWING-MACHINE TABLE.—J. J. Wheat, Wheeling, W. Va.
108,075.—SECTIONAL STEAM GENERATOR.—Harry Whittingham, New York city.
108,076.—HAY KNIFE.—Daniel H. Wile, New Pittsburgh, Ohio.
108,077.—UMBRELLA.—R. C. Williams, Frankfort, Ky.
108,078.—LAMP BURNER.—Samuel R. Wilmot, Bridgeport, Conn.
108,079.—JOURNAL BOX.—E. D. Murfey, New York city, assignor to Manhattan Packing Manufacturing Co.
108,080.—JOURNAL BEARING.—E. D. Murfey, New York city, assignor to Manhattan Packing Manufacturing Co.
108,081.—JOURNAL BOX.—E. D. Murfey, New York city, assignor to Manhattan Packing Manufacturing Co.

REISSUES.

4,137.—DEODORIZING APPARATUS FOR CLOSET.—Earth Closet Company, Hartford, Conn., assignee of Henry Moule and Henry John Girdlestone.—Patent No. 91,474, dated June 15, 1869. Division A.
4,138.—EARTH CLOSET.—Earth Closet Co., Hartford, Conn., assignee of Henry Moule and H. J. Girdlestone.—Patent No. 91,474, dated June 15, 1869. Division B.
4,139.—HARVESTER.—Rufus Dutton, Yonkers, N. Y.—Patent No. 31,709, dated March 19, 1861; reissue No. 1,762, dated Sept. 13, 1864. Division A.
4,140.—COCK.—J. P. Gallagher, St. Louis, Mo.—Patent No. 48,673, dated July 11, 1865.
4,141.—WASHING APPARATUS.—J. T. Grose (assignor to himself and W. E. Kinnear), Upper Sandusky, Ohio.—Patent No. 98,585, dated Jan. 4, 1870.
4,142.—MACHINE FOR BUNDLING WOOD.—W. L. Williams and T. J. O'Connor, New York city, assignees of W. L. Williams.—Patent No. 26,147, dated Nov. 15, 1859.
4,143.—POSTOFFICE POST-MARKING AND CANCELING HAND STAMP.—M. P. Norton (assignor to H. M. Ingalls), Troy, N. Y., Patent No. 38,175, dated April 14, 1863; reissue No. 1,748, dated Aug. 23, 1864; reissue No. 3,586, dated Aug. 3, 1869. Division A.
4,144.—HAND CANCELING STAMP.—M. P. Norton, Troy, N. Y., assignor, by mesne assignments, to the "Secombe Manufacturing Co.," New York city.—Patent No. 38,175, dated April 14, 1863; reissue No. 1,748, dated August 23, 1864; reissue No. 3,586, dated August 3, 1869. Division B.
4,145.—FRUIT BASKET.—Lauren Carpenter, St. Joseph, Mich.—Patent No. 102,488, dated May 3, 1870.
4,146.—TABLE LEAF SUPPORTER.—G. L. Gerard, New Haven, Conn.—Patent No. 106,353, dated Aug. 16, 1870.
4,147.—COAL HOD.—E. A. Jeffery, New Haven, Conn.—Patent No. 52,856, dated Feb. 27, 1866.
4,148.—MANUFACTURE OF RUBBER OR GUTTA-PERCHA HOSE.—Edward L. Perry and Charles Manheim, New York city, assignors to the Combination Rubber Company, and the Gutta-percha and Rubber Manufacturing Company.—Patent No. 92,353, dated July 6, 1869.

DESIGNS.

4,375.—CLOCK FRONT.—John H. Bellamy, Charlestown, Mass., assignor to S. D. Niles and Benjamin A. Ward of three fourths of his right.
4,376.—STOVE PLATE.—L. W. Harwood (assignor to Fuller, Warren & Co.,) Troy, N. Y.
4,377 to 4,379.—IRON RAILING FOR HORSE STALL.—J. L. Jackson, New York city. Three Patents.
4,380.—LID OF A FEED CUP IN BIRD CAGE.—Otto Lindenmann, New York city.
4,381.—MEDALLION OR CAMEO.—Leopold Salomons, London, England, assignor to J. W. Chisholm and K. Chisholm, New York city.
4,382.—SPOON AND FORK HANDLE.—B. D. Beiderhase, New York city.
4,383.—COLLAR BOX.—A. L. Elliot, Boston, Mass.
4,384.—BOX FOR HOLDING AND DISPLAYING BRAIDS, TAPES, ETC.—S. B. Fleisher, Philadelphia, Pa.
4,385.—PLATE FOR PITCHER STAND.—H. O. Fritsch, New York city.
4,386.—KNITTED FABRIC.—Edward Greasly, Philadelphia, Pa.
4,387.—COFFIN.—E. T. Smith and J. S. Winston, New York city.
4,388.—DRESS GOODS.—Matthew Townsend, Canton, Mass.

APPLICATIONS FOR THE EXTENSION OF PATENTS.

MACHINE FOR HUSKING CORN.—Robert Bryson, Schenectady, N. Y., has applied for an extension of the above patent. Day of hearing Nov. 23 1870.

MOWING MACHINE.—Andrew M. Hall, of Falmouth, Me., has petitioned for an extension of the above patent. Day of hearing Dec. 7, 1870.

MANUFACTURING CALENDER ROLLS.—John Worsley, Providence, R. I., has applied for an extension of the above patent. Day of hearng Dec. 7, 1870.

MACHINES FOR POINTING SHOE PEGS.—George Hoyt, Ashland (formerly Holderness), N. H., has petitioned for an extension of the above patent Day of hearing Dec. 7, 1870.

New Patent Law of 1870.

INSTRUCTIONS

HOW TO OBTAIN

LETTERS-PATENT

FOR

NEW INVENTIONS.

Information about Caveats, Extensions, Interferences, Designs, Trade-Marks, and Foreign Patents.

FOR Twenty-five years, MUNN & Co. have occupied the leading position of **Solicitors of American and European Patents.** During this long experience they have examined not less than *Fifty Thousand Inventions*, and have prosecuted upwards of THIRTY THOUSAND APPLICATIONS FOR PATENTS. In addition to this they have made, at the Patent Office, *Twenty-Five Thousand* Special Examinations into the novelty of various Inventions.

The important advantage of MUNN & Co.'s American and European Patent Agency is that the practice has been tenfold greater than that of any other agency in existence, with the additional advantages of having the aid of the highest professional skill in every department and a Branch Office at Washington, that watches and supervises cases when necessary, as they pass through Official Examination.

MUNN & CO.,

Ask Special Attention to their System of doing Business.

Consultation and Opinions Free.

Inventors who desire to consult with MUNN & Co. are invited to call at their office 37 PARK ROW, or to send a sketch and description of the invention, which will be examined and an opinion given or sent by mail without charge.

A SPECIAL EXAMINATION

is made into the novelty of an invention by personal examination at the Patent Office of all patented inventions bearing on the particular class. This search is made by examiners of long experience, for which a fee of $5 is charged. A report is given in writing.

To avoid all possible misapprehension, MUNN & Co. advise generally, that inventors send models. But the Commissioner may at his discretion dispense with a model—this can be arranged beforehand.

MUNN & Co. take special care in preparation of drawings and specifications.

If a case should for any cause be rejected it is investigated immediately, and the rejection if an improper one set aside.

NO EXTRA CHARGE

is made to clients for this extra service. MUNN & Co. have skillful experts in attendance to supervise cases and to press them forward when necessary.

REJECTED CASES.

MUNN & Co. give very special attention to the examination and prosecution of rejected cases filed by inventors and other attorneys. In such cases a fee of $5 is required for special examination and report; and in case of probable success by further prosecution and the papers are found tolerably well prepared, MUNN & Co. will take up the case and endeavor to get it through for a reasonable fee to be agreed upon in advance of prosecution.

CAVEATS

Are desirable if an inventor is not fully prepared to apply for a Patent. A Caveat affords protection for one year against the issue of a patent to another for the same invention. Caveat papers should be carefully prepared.

The Government fee on filing a Cave is $10, and MUNN & Co.'s charge for preparing the necessary papers is usually from $10 to $12.

REISSUES.

A patent when discovered to be defective may be reissued by the surrender of the original patent, and the filing of amended papers. This proceeding should be taken with great care.

DESIGNS, TRADE-MARKS, & COMPOSITIONS

Can be patented for a term of years, also new medicines or medical compounds, and useful mixtures of all kinds.

When the invention consists of a medicine or compound, or a new article of manufacture, or a new composition, samples of the article must be furnished, neatly put up. There should also be forwarded a full statement of its ingredients, proportions, mode of preparation, uses, and merits.

CANADIANS and all other foreigners can now obtain patents upon the same terms as citizens.

EUROPEAN PATENTS.

MUNN & Co. have solicited a larger number of European Patents than any other agency. They have agents located at London, Paris, Brussels, Berlin, and other chief cities. A pamphlet containing a synopsis of the Foreign Patent Laws sent free.

MUNN & Co. could refer, if necessary, to thousands of patentees who have had the benefit of their advice and assistance, to many of the principal business men in this and other cities, and to members of Congress and prominent citizens throughout the country.

All communications are treated as confidential.

Address

MUNN & CO.,

No. 37 Park Row,

NEW YORK.

© 1870 SCIENTIFIC AMERICAN, INC.

PATENT RIGHTS SOLD ON COMMISSION.

B) E. E. ROBERTS & CO., Consulting Engineers, 15 Wall st., New York. Send Stamp for Circular.

5.000 AGENTS WANTED.—Samples sent free, with terms, to clear from $5 to $10 per day. Two entirely new articles saleable as flour. Address N. M. WHITE, Newark, N. J.

BENT, GOODNOW & CO., Boston, Mass., Publishers of "PATENT STAR," sell Patent Rights and goods of all kinds. Orders solicited. AGENTS WANTED.
☞ Send stamp for copy.

$100 TO 250 per month guaranteed. Sure pay, to all ambitious men and women selling our world-renowned Patent Silver Mold White Wire Clothes Lines. Business permanent. For full particulars, address GIRARD WIRE MILLS, Philadelphia, Pa.

Solid Emery Wheels,

UNION, OR NORTHAMPTON, Full Stock, all sizes, at manufacturer's prices, by A. J. WILKINSON & CO., 2 Washington st., Boston.

Agents! Read This!

WE WILL PAY AGENTS A SALARY of $30 per week and expenses, or allow a large Commission, to sell our new and wonderful inventions. Address M. WAGNER & CO., Marshall, Mich.

BOOKS

FOR PRACTICAL MEN.

My new and enlarged Catalogue of PRACTICAL AND SCIENTIFIC BOOKS, 82 pages, 8vo., will be sent, free of postage, to any one who will favor me with his address.

HENRY CAREY BAIRD,
Industrial Publisher, 406 Walnut St.,
PHILADELPHIA.

A. S. & J. Gear & Co.,

BOSTON.—We are well pleased with the Variety Molding Machine. There has been no failure in any part of it. We know of no machine we would venture to substitute for it. G. ALBIN, SON & CO., Coffin and Casket Manufacturers, Springfield, Ohio, Dec. 11, 1869.

SWINDLING VENTILATED.—Rascality Exposed. The "STAR SPANGLED BANNER," a Rich, Rare, and Racy 8-page, 40-column Paper, nearly Ledger size, full of Sketches, Poetry, Fun, Wit, and Humor. Makes a specialty of EXPOSING SWINDLERS; 200 "shown up" in 1870; millions of dollars saved. It gives a new $3 Engraving, 19x24 inches, "Pioneers of America," to each subscriber, and it is only 75 cents a year. Specimen for stamp. Address "STAR SPANGLED BANNER,", Hinsdale, N. H.

PATENTS SOLD ON COMMISSION.

Patentees everywhere approve our new system. Inventors save expense and secure from us guarantees for the faithful transaction of their business not obtainable elsewhere. For terms and references, address C. H. PHELPS & CO., Financial Agts., 98 Broadway, N.Y.

LLP—Agents wanted to sell by subscription that photographic gem of Christian art THE LORD'S PRAYER PICTURE. It contains portraits of Christ and His Apostles, pictures of the principal scenes in His Life, and the Lord's Prayer in letters of elaborate and beautiful design. The original was executed by the pen—is the result of *six years labor*—the most comprehensive and popular work ever issued—indorsed by the Press and Clergy.
Exclusive Territory assigned, and liberal inducements. Miniature, Twenty-five cents. Send stamp for full particulars.

TRUBSHAW & MILLER,
58 Fulton street, New York.

TO CAR-WHEEL MAKERS.

WANTED IMMEDIATELY—In one of the British Provinces, an experienced person to take charge of a Foundery, chiefly occupied in car-wheel making. He must know the business in its several branches thoroughly. Apply by letter to L. N. S., care of Messrs. S. M. PETTENGILL & CO., 37 Park Row, New York.

THE AMERICAN HATTERS' CONFORMERTER. Invented and manufactured by Samuel Clark, 20 West 13th st. Used by the best and principal hatters in this city and country, and pronounced by them to be very greatly superior to any other construction. They are the only article made that will make a hat fit, and consequently they produce business. A boy can fit a hat with them. The price is no consideration compared to their quality.
Send for a Circular.

School of Mines.

COLUMBIA COLLEGE. — Practical and Theoretical Instruction in Civil and Mining Engineering, Metallurgy, Geology, Mineralogy, Assaying, Analytical and Technical Chemistry, Physics, Mechanics, Mathamatics, Drawing, French, German, etc., with Laboratory Practice. Regular courses for the degrees of Civil and Mining Engineer, Bachelor and Doctor of Philosopy. Special students received without examination. Pecuniary aid for those who require it. Reopens on Monday, Oct. 3d. Examinations for admission to the regular courses Thursday, Sept. 29 For further information, and for catalogues, apply to C. F. CHANDLER, Dean of the Faculty, East 49th st., New York.

Niagara Steam Pump

CHAS. B. HARDICK,
Adams st., Brooklyn, N. Y.

WESTERN — BEST STORY PAPER in the WORLD. Sold everywhere. 6c. $3 a year. A $5 Prize to every Subscriber. Send two stamps for specimen copy.
BOSTON, MASS.

EMERY GRINDERS. PAT. AUG. 3, 69. APRIL 5, 1870.

ADAPTED TO SUCH A WIDE VARIETY of useful purposes that it will pay for everybody having power to use them. Now on exhibition at American Institute Fair. Address AMERICAN TWIST DRILL CO., Woonsocket, R. I.

SHINGLE AND HEADING MACHINE—Law's Patent with Trevor & Co.'s Improvements The Simplest and Best in use. Also, Shingle, Heading, and Stave Jointers, Equalizers, Heading Turners, Planer etc. Address TREVOR & CO., Lockport, N. Y.

RICHARDSON, MERIAM & CO., Manufacturers of the latest improved Patent Dan iels' and Woodworth Planing Machines, Matching, Sash and molding, Tenoning, Mortising, Boring, Shaping Vertical and Circular Re-sawing Machines, Saw Mills, Saw Arbors, Scroll Saws, Railway, Cut-off, and Rip-saw Machines, Spoke and Wood Turning Lathes, and various other kinds of Wood-working Machinery. Catalogues and price lists sent on application. Manufactory, Worcester, Mass. Warehouse, 107 Liberty st., New York. 17 1

THE
Practical Draftsman's Book of
INDUSTRIAL DESIGN
AND MACHINISTS' & ENGINEERS' DRAWING COMPANION.

Forming a Complete Course of Mechanical, Engineering, and Architectural drawing. From the French of MM. Armengaud the elder, Prof. of Design in Conservatoire of Arts and Industry, Paris; and MM. Armengaud the younger, and Amoroux, Civil Engineers, Rewritten and arranged with additional matter and plates, selections from and examples of the most useful and generally employed mechanism of the day. By Wm. Johnson, Assoc. Inst., C.E. Illustrated by 50 folio steel plates and 50 wood cuts. A new edition. 4to.....$10

☞ The above or any of my Books sent by mail, free of postage, at the publication prices. My new revised and enlarged CATALOGUE OF PRACTICAL AND SCIENTIFIC BOOKS, 82 pp. 8vo, now ready, complete to Sept. 15, 1870, will be sent, free of postage, to any one who will favor me with his address.

HENRY CAREY BAIRD,
Industrial Publisher,
406 Walnut st., Philadelphia, Pa.

WATCH FREE, & $30 a Day sure, and no humbug. Address LATTA & CO., Pittsburgh, Pa

WANTED—Improved Shears or other apparatus, suitable for cutting up old Boiler and other scrap. BATTELLE & CO., Memphis, Tenn.

FOR SALE—Foundery and Machine Shop, in best location in Northwest; well established; doing good business. A. R. McGILL, St. Paul, Minn.

BEST BOOK FOR AGENTS.—It is indispensable. Everybody wants it. All should have it.
HOW TO WRITE. | HOW TO BEHAVE.
HOW TO TALK | HOW TO DO BUSINESS.
A Complete Letter-Writer; a correct Speaker and Chairman's Guide; Rules for Republican—not Court or European—Etiquette, and a Business Man's Counsellor. It is just the work for every American who would fit himself for success in any, and in every office, position, or pursuit. Liberal terms to agents. Sent first post for $2.25, by S. R. WELLS, 389 Broadway, N. Y.
N. B.—A copy of this book will be given as a premium for two NEW subscribers, at $3 each, to the PHRENOLOGICAL JOURNAL. Boys, here is a good chance for you. Who will have this Free Gift?

MACHINISTS.

Illustrated Catalogue and Price List of all kinds of small Tools & Materials sent free to any address. GOODNOW & WIGHTMAN, 23 Cornhill, Boston, Mass.

1832. SCHENCK'S PATENT 1870.
Woodworth Planers.

And Re-sawing Machines, Wood and Iron Working Machinery, Engines, Boilers, etc. JOHN B. SCHENCK & SON, Matteawan, N. Y., and 118 Liberty st., New York.

$60 A WEEK paid Agents in a new business. Address Saco Novelty Co., Saco, Me.

MACHINISTS' TOOLS FOR SALE.—A large variety of New and Second-hand Tools at VERY LOW PRICES. Railroad ave., Newark, N. J., and 119 Liberty st., N. Y. GOULD MACHINE CO.

Magic Lanterns For Public Exhibitions, etc Catalogues free to any address.
T. H. McALLISTER,
Optician, 49 Nassau St., N. Y.

Microscopes For scientific and popular investigations. Price List free to any address.
T. H. McALLISTER,
Optician, 49 Nassau St., N. Y.

COOPER'S Portable Engines with Steam Pumps & Lime-extracting Heaters & Saw Mills, cutting 10 to 20 M per day. Stationary Engines, Boilers, and Mill Machinery. **$1.500** purchase a complete 2-Rim Grist Mill, with modern improvements. Prices Reduced. Circulars free. JOHN COOPER & CO., Mt. Vernon, O.

Safety Hoisting Gear,

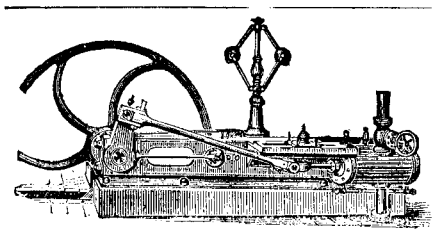
PATENTED AND MADE BY
MERRICK & SONS,
Philadelphia, Pa.

MULTIPLYING PRESSURE
FAN BLOWERS.

The Rahway M'f'g Co.,.....Rahway, N. J

SENT FREE!

A NEW ILLUSTRATED CATALOGUE of Machinist's Tools and Supplies, at reduced prices, by A. J. WILKINSON & Co., 2 Washington St., Boston.

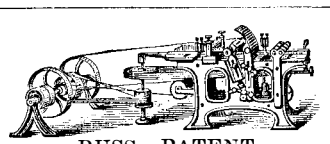


Rider Governor Cut-off Engines,

Horizontal, Vertical, and Inclined,

EMBRACING, without complication, all the perfections attained in the most complex Engines, the smallest sizes having all the excellence of the larger ones, a feature not possible in any other construction of high class expansion Engines.
THE GREATEST attainable economy and perfect regulation, by the most simple and durable mechanism. A large number now in operation Pamphlets and Price List on application.

DELAMATER IRON WORKS,
Foot West 13th st., New York.



RUSS PATENT
MONITOR MOLDING MACHINE,
MADE BY
R. BALL & CO., Worcester, Mass.,

Manufacturers of the latest improved WOOD-WORKING MACHINERY for Planing Mills, Car Shops, Agricultural Implement, Furniture, Sash, Blind, and Door Factories, etc., etc. Send for illustrated catalogue and price list.
RICHARD BALL. E. P. HALSTED.

Buy Barber's Bit Brace.

LATHE CHUCKS—HORTON'S PATENT—from 4 to 36 inches. Also for car wheels. Address E. HORTON & SON Windsor Locks Conn.

IMPORTANT

TO MACHINISTS.—The Best Metal for all Machine Uses is the MARTIN STEEL, made by THE NEW JERSEY STEEL AND IRON CO., Trenton, N. J This steel is made by an entirely different process from any other, and is tougher than wrought iron. It can be turned without annealing, being entirely free from hard spots. Every one who uses it pronounces it just what they have long wanted, for a multitude of uses, such as Crank Pins, Lathe Spindles and Screws, Cotton Machinery Rollers, Saw and Fan Spindles, etc., etc. Also, particularly adapted for Firebox Plates. Prices Low. Send for further information, or a sample, stating use to which it is to be applied.

A PRACTICAL TREATISE ON
Soluble or Water Glass,
BY Dr. L. FEUCHTWANGER,

(The only work in English published). Hundreds of formulas to silicify stone and brick, to render railroad sleepers, shingles, and wooden pavements fire and dry-rot proof; for making every species of cements, white-washes, and paints, also for soap; concluded by essays on carbonic acid, limestones, alkalies, and silicia, and a guide for glass manufacturers; with several wood cuts. 350 pages. Price, $3·20; mailed free—by
L. & J. W. FEUCHTWANGER,
No. 55 Cedar street, N. Y. P. O. Box 3616.

SILICATE OF SODA, IN ITS VARIOUS forms, manufactured as a specialty, by Philadelphia Quartz Co., 733 South 2d st., Philadelphia Pa.

ROBERT McCALVEY, Manufacturer of HOISTING MACHINES AND DUMB WAITERS. 602 Cherry st., Philadelphia, Pa.

L. W. Pond's New Tools.

NEW AND IMPROVED PATTERNS—Lathes, Planers, Drills, Milling Machines, Boring Mills, Gear and Belt Cutters Punches and Shears for Iron. Office

98 9 Ate **98**

Liberty st., New York. Works at Worcester, Mass.

VINEGAR.—How Made from Cider, Wine Molasses, or Sorghum in 10 hours, without using drugs. For circulars, address F. I. SAGE, Vinegar Maker. Cromwell Conn.

Andrews' Patents.

Noiseless, Friction Grooved, Portable, and Warehouse Hoisters.
Friction or Geared Mining & Quarry Hoisters.
Smoke-Burning Safety Boilers.
Oscillating Engines, Double and Single, half to 100-Horse power.
Centrifugal Pumps, 100 to 100,000 Gallons per Minute, Best Pumps in the World, pass Mud, Sand, Gravel, Coal, Grain, etc., without injury.
All Light, Simple, Durable, and Economical.
Send for Circulars.
WM. D. ANDREWS & BRO.,
414 Water street, New York.

BUERK'S WATCHMAN'S TIME DETECTOR.—Important for all large Corporations and Manufacturing concerns—capable of controlling with the utmost accuracy the motion of a watchman or patrolman, as the same reaches different stations of his beat Send for a Circular. J. E. BUERK,
P. O. Box 3,057, Boston, Mass.
N. B.—This detector is covered by two U. S. patents. parties using or selling these instruments without authority from me will be dealt with according to law.

WROUGHT IRON BEAMS & GIRDERS

THE Union Iron Mills, Pittsburgh, Pa. The attention of Engineers and Architects is called to our improved Wrought-iron Beams and Girders (patented), in which the compound welds between the stem and flanges, which have proved so objectionable in the old mode of manufacturing, are entirely avoided, we are prepared to furnish all sizes at terms as favorable as can be obtained elsewhere. For descriptive lithograph address the Union Iron Mills, Pittsburgh, Pa

THE WOODWARD STEAM-PUMP MANUFACTURING COMPANY, Manufacturers of the Woodward Pat. Improved Safety Steam Pump and Fire Engine, Steam, Water, and Gas Fittings of all kinds Also, Dealers in Wrought-iron Pipe, Boiler Tubes, etc. Hotels, Churches, Factories, & Public Buildings, Heated by Steam, Low Pressure. Woodward Building, 76 and 78 Center st., cor. of Worth st. (formerly of 77 Beekman st.) N.Y. All parties are hereby cautioned against infringing the Pat. Right of the above Pump. G. M. WOODWARD, Prest

Larkin.—The Practical Brass and Iron Founder's Guide: A concise treatise on brass founding, molding, the metals and their alloys, etc.; to which are added recent improvements in the manufacture of iron, steel by the Bessemer process, etc., etc. By James Larkin, late conductor of the brass foundery department in Reany, Neafie & Co.'s Penn Works, Philadelphia. Fifth edition, revised, with extensive additions. In 1 vol., 12mo.....$2 25

☞ The above, or any of my Books, sent by mail, free of postage, at the publication price. My new and enlarged Catalogue of PRACTICAL & SCIENTIFIC BOOKS, 82 pages, 8vo, now ready, complete to Sept. 15, 1870, will be sent, free of postage, to any one who will favor me with his address.

HENRY CAREY BAIRD,
Industrial Publisher, 406 Walnut St.
PHILADELPHIA.

Milling Machines,

INDEX, STANDARD, UNIVERSAL, AND HORIZONTAL.—The largest variety to be found in the country, on hand and finishing. Workmanship, Material, and Design unsurpassed. Machines on exhibition at Fair of American Institute. UNION VISE CO. OF BOSTON. Office 80 Milk st. Works at Hyde Park, Mass.

THOMSON'S PAT. ROAD STEAMERS.—The undersigned, Sole Manufacturer, under Thomson's American Patents, is now prepared to accept orders for these celebrated Traction Engines. They will draw from 12 to 30 tuns, over ordinary roads, and at a great saving as compared with horses. A Steamer, with a train of loaded wagons, may be seen at work near New York.—For particulars apply to D. D. WILLIAMSON 32 Broadway, New York, or P. O. 1,809.

FOR ROCK LIFTING AND WALL LAYING MACHINERY Address
G. L. SHELDON, Hartsville, Berkshire Co., Mass.

50 CENTS TO $5
PER EVENING, AT HOME!

We are prepared to furnish profitable employment to Men and Women at their homes. One person in each locality throughout the United States, can engage in this business at great wages. We send, FREE full particulars and a valuable sample, which will do to commence work on. Any person seeing this notice, who wants profitable, permanent work, should send us their address, without delay.
E. C. ALLEN & Co., Augusta, Maine.

AGENTS WANTED—($225 A MONTH) by the AMERICAN KNITTING MACHINE CO., Boston, Mass., or St. Louis, Mo.

LANDRIN ON STEEL.
JUST PUBLISHED.
A Treatise on Steel: Comprising its Theory, metallurgy, properties, practical working, and use. By M. H. C. Landrin, Jr., C.E. Translated from the French with notes, by A. A. Fesquet, Chemist and Engineer. With an appendix on the Bessemer and the Martin processes for manufacturing steel, from the report of Abram S. Hewitt, United States Commissioner to the Universal Exposition, Paris, 1867. In one volume, 12mo Price $3. Sent by mail free of postage.

☞ The above, or any of my Books, sent by mail, free of postage, at the publication price. My new and enlarged Catalogue of PRACTICAL AND SCIENTIFIC BOOKS, 82 pages, 8vo., now ready, complete to Sept. 15, 1870, will be sent, free of postage, to any one who will favor me with his address.

HENRY CAREY BAIRD,
Industrial Publisher, 406 Walnut St.,
PHILADELPHIA.

Bloomington Nursery.

600 Acres. 19th Year. 10 Greenhouses.

Fruit & Ornamental Trees, Nursery Stock, Evergreens, Rootgrafts, Hedge Plants, Tulips, Hyacinths, Crocus, Lilies, Colored Fruit and Flower Plates. All at Wholesale and Retail. Send 10c. for Catalogues.
F. K. PHŒNIX, Bloomington, Ill.

PORTABLE Steam Engine & Boiler, complete:

4-Horse Power	$ 550	4-Horse Power	$220
6 " "	670	6 " "	250
8 " "	780	8 " "	325
12 " "	1,000	15 " "	425
15 " "	1,100	25 " "	675
20 " "	1,500	☞ Send for Illustrated circular.	
25 " "	1,600		

STATIONARY Steam Engine, without Boiler:

For Sale by H. B. BIGELOW & CO., New Haven.

WOOD-WORKING MACHINERY GENERALLY. Specialties, Woodworth Planers and Richardson's Patent Improved Tenon Machines. Nos. 24 and 26 Central, corner Union st., Worcester, Mass. Warerooms 42 Courtlandt st., New York.
WITHERBY RUGG. & RICHARDSON.

P. Blaisdell & Co.,

MANUFACTURERS OF MACHINISTS' Tools, Improved Engine Lathes, Planers, Boring Mills, Gear Cutters, Hand Lathes, Traverse Drills, and the "Blaisdell" Patent Upright Drills. Jackson street Worcester, Mass.

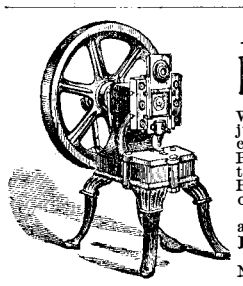
CINCINNATI BRASS WORKS. — Engineers' and Steam Fitters' Brass Work. Best Quality at very Low Prices. F. LUNKENHEIMER, Prop'r,

THE BEST PUNCHING PRESSES ARE made by the Inventor and Patentee of the famous Eccentric Adjustment. Infringements upon said Patent will be severely dealt with. N. C. STILES,
Middletown, Conn.

MODELS, PATTERNS, EXPERIMENTAL, and other machinery, Models for the Patent Office, built to order by HOLSKE MACHINE CO., Nos. 528, 530, and 532 Water st., near Jefferson. Refer to SCIENTIFIC AMERICAN office. 14 tf

STEAM PIPE FOR HEATING FACTORIES.
MANUFACTURED BY PARKER BRO'S WEST MERIDEN, CONN.

WANTED---AGENTS, 20 per day, to sell the celebrated HOME SHUTTLE SEWING MACHINE. Has the under-feed, makes the "lock stitch" alike on both sides, and is fully licensed The best and cheapest Family Sewing Machine In the market. Address
JOHNSON, CLARK & CO.,
Boston, Mass.; Pittsburgh, Pa.; Chicago, Ill., or St. Louis, Mo.

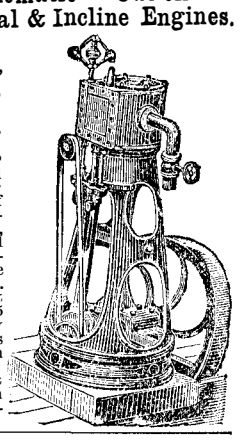


PARKER
Punching Presses,

With Patent Eccentric adjustment, to raise and lower the punch. All Power Presses, having an eccentric adjustment of the Punch, are infringements of our Patent.
☞ Send for circular and copy of our Patent.
PARKER BROS.,
West Meriden, Conn.
New York, 27 Beekman st.

Rider's Automatic Cut-off
Vertical, Horizontal & Incline Engines.

MANUFACTURED BY THE
Albany st. Iron Works,
Handren & Ripley,
PROPRIETORS.
Office, 126 Washington st.,
New York.



The advantages obtained by these Engines over others are: Economy of fuel and space, perfect regulation of speed by cut-off, simplicity of design, and non-liability of derangement, requiring no more care than common engines.
Also, Patent Air Front Boiler, which will save 25 per cent over the ordinary boiler in fuel, being as durable and more safe than others.
Descriptive Pamphlets & Price lists mailed free on application to the proprietors.

U.S. PIANO CO. N.Y. $290. FOR 1ST CLASS 7 OCT SENT ON TRIAL—CIRCULARS MAILED FREE.

WOODBURY'S PATENT
Planing and Matching

and Molding Machines, Gray & Wood's Planers, Self-oiling Saw Arbors, and other wood working machinery.
S. A. WOODS, { 91 Liberty street, N. Y.;
Send for Circulars. { 67 Sudbury street, Boston

PORTABLE STEAM ENGINES COMBINING the maximum of efficiency, durability and economy, with the minimum of weight and price. They are widely and favorably known, more than **750** being in use. All warranted satisfactory or no sale. Descriptive circulars sent on application. Address
J. C. HOADLEY & CO., Lawrence, Mass.
46 Cortlandt st., New York.

DIES FOR CUTTING BRASS MARKING Plates, Good Shaped Letters, Sharp Cutting Edges, on best cast steel, Hardened and Tempered Heads and Faces, and warranted the best. Samples sent.
ROBERT ROGERS, 26 Spruce st, New York.

BURDON IRON WORKS.—Manufacturers of Pumping Engines for Water Works, High & Low Pressure Engines, Portable Engines and Boilers, of all kinds, Sugar Mills, Screw, Lever, Drop, & Hydraulic Presses, Machinery in general. HUBBARD & WHITTAKER, 102 Front st., Brooklyn.

© 1870 SCIENTIFIC AMERICAN, INC.

Advertisements.

Advertisements will be admitted on this page at the rate of **$1·00** *per line. Engravings may head advertisements at the same rate per line, by measurement as the letter-press.*

REVOLUTION

IN

TIN-LINED LEAD PIPE.

PRICE PER LB. GREATLY REDUCED.

TO SATISFY THE PUBLIC beyond the possibility of doubt, as regards the strength and durability of our TIN-LINED LEAD PIPE, we have recently increased the thickness and weight of the several sizes and letters, making them, in all cases, to correspond exactly with like sizes and letters of the ordinary lead pipe. This establishes our TIN-LINED LEAD PIPE as the strongest flexible Pipe in use. With the increase in weight, we have also reduced the price per pound nearly one-half, making the cost per foot on the heavy pipe, adapted to plumbing, about the same as before, while the lighter pipes, used so extensively for conveying water from springs and ponds, are reduced in cost fully one third. The greater density the metals receive, owing to the fact that double the pressure is required to make tin-lined lead pipe, adds materially to their resisting power. Architects and plumbers cannot fail to be satisfied that, with weight for weight, and thickness for thickness, a pipe so constructed is decidedly stronger than the ordinary lead pipe. The increased thickness of the lead coating allows the joints and connections to be made with ordinary plumbers' solder, without effecting the strength of the pipe. As to which is the purest and safest pipe for domestic use, it is not difficult to determine. Our TIN-LINED LEAD PIPE can be known by our Trade Mark, which is four ribbed lines running lengthways of the pipe at equal quarter distances. In ordering, or making inquiries for price, send bore of pipe required, and head or pressure of water. Circulars and sample of pipe sent by mail free. Warranted to be stronger and more durable than Lead Pipe of corresponding sizes and letters. Address the COLWELLS, SHAW & WILLARD M'F'G CO., No. 213 Center st., New York; also manufacturers of Block Tin Pipe, Sheet Lead, Lead Pipe, Solder, etc.

J. Marsching & Co.,

42 John st., New York. The importation of German Metal Leaf and BRONZE POWDER a Specialty; a large and well assorted stock of superior quality goods constantly on hand. Prices lowest in the market.

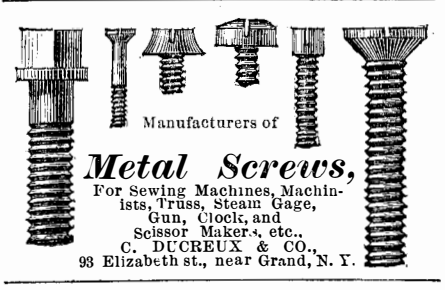
PAINTS For House and Decorative Painting, Fine Coach and Car Work, etc. Send for Special Catalogue to C. T. RAYNOLDS & CO., Color Makers, New York.

AT GREATLY REDUCED PRICES.— Mathematical Instruments of German, Swiss, and French manufacture.

Chesterman's Tape Measures,

Of Steel and Linen. Transits, Levels, Compass Drawing Materials. JAMES W. QUEEN & CO., 924 Chestnut st., Philadelphia. No. 5, Dey st., New York. Priced & illustrated Manual of 112 pages on application.

Cures Cuts, Burns, Wounds, and all disorders of the Skin. Recommended by Physicians. Sold by all Druggists at 25c. JOHN F. HENRY, Sole Proprietor, 8 College Place, New York.



Manufacturers of

Metal Screws,

For Sewing Machines, Machinists, Truss, Steam Gage, Gun, Clock, and Scissor Makers, etc.,
C. DUCREUX & CO.,
93 Elizabeth st., near Grand, N. Y.

WM. WRIGHT & CO.,

NEWBUGH, N. Y.,

BUILDERS OF WRIGHT'S PATENT

Steam Engine,

WITH

Variable Cut-Off,

Are now Prepared to take Orders. The work will be done under the immediate direction of the Inventor.

DOUBLE THICK ROOFING.

This Roofing is made of the best all-wool felt doubled, and is prepared by saturation with a preservative compound and all ready to be put on to flat or steep roofs, and cover with our Quartz Cement, thus making a cheap and durable fire and weather-proof roof, at an expense of less than $3 50 per square. It can be put on by any one, needs no special skill, and no warming, except in cold weather. Full directions and samples of the Double-thick Roofing, as well as samples of Patent Building Paper, sent free to any address, by ROCK RIVER PAPER CO., Chicago, Ill. B. E. HALE, 22 and 24 Frankfort st., New York.

UNIVERSAL CLOTHES WRINGER

THE UNIVERSAL WRINGER has been in use in our family for years, giving entire satisfaction. We speak whereof we know when we say it is one of the best labor-saving machines ever invented, having several points of superiority over any Wringer we have examined.—[New York Liberal Christian, April 2, 1870.

"It really merits all the good that can be said of it."—[Moore's rural New Yorker.

"The Universal 'the best'."—[Am. Agriculturist.

☞ Sold by dealers generally. R. C. BROWNING
Gen'l Ag't, 32 Cortlandt st. New York.

Use the

Averill Chemical Paint.

PUREST WHITE

AND ALL THE

FASHIONABLE SHADES.

"Ready for Use; Requires no Oil. Thinning, or Driers."

AND SOLD ONLY BY THE GALLON.

Costs Less than Pure Lead and Oil, and will Wear longer than any other Paint.

Recommends from all sections of the country, comprising the owners of many of the finest villas and residences in the land as well as recommendations from the largest manufacturers in the country who have used it. Can be obtained, with Sample Card and Price list, free of charge, by addressing

Averill Chemical Paint Co.....New York.
do. do. do. do.....Cleveland, O.
Dening & Son.....Calais, Me.
John Mulliken & Co.....Boston, Mass.
Robert Shoemaker & Co.....Phil'a, Pa.
R. & W. H. Cathcart.....Balti're, Md.
G. W. Pitkin.....Chicago, Ill.
Lawrence & Co.....Cincinnati, O.
Hall, Moses & Co.....Columbus, Ga
W. P. Converse, Jr.....New Orleans.

WOOD'S HOUSEHOLD MAGAZINE contains in every number one complete prize story valued at $100. Forty pages of other matter. Yearly $1. Sold by News dealers at 10 cents per copy. Splendid Premiums. $500 cash to be awarded for prize clubs. Specimen copy free. Address
S. S. WOOD, Newburgh, N. Y.

WANTED— To Buy a Good Matching and Molding Machine either new or second-hand, if in good condition to work four sides, from 1 to 10 or 12-in. wide. Address
W. C. ROBINSON,
Lyons, N. Y., with description and price.

The Tanite Co.

S. A. WOODS, 91 Liberty st., having been appointed General Agent of the above Company, will hereafter keep constantly on hand a full stock of their celebrated goods, consisting of

The Tanite Emery Wheel.
Tanite Emery Oil Stones.
Tanite Co.'s Patent Emery Grinders.
Tanite Co.'s Saw Gummers.
Tanite Co.'s Patent Flanges, etc., etc.

The only New York Agency of the Tanite Company is at the office of
S. A. WOODS,
91 Liberty st., New York.

SMITH'S AMERICAN ORGANS

Are universally admired for

Their Melodious Quality of Tone, Their Easy and Elastic Action, Their Steady Power, and Their Elegant Finish.

Owing to recent improvements in mechanism, they are adapted equally well to light and graceful music and to the graver styles.

No instruments afford such a sympathetic and satisfactory accompaniment to the voice.

Those who have formed their opinions of reed organs from their recollections of the antiquated "Melodeon," should now hear the full volume of round tone, and all the fine effects produced by these superb instruments.

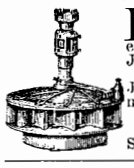
Those who are intending to purchase, and **all who are interested in musical art,** are reminded that they can easily be satisfied as to the truth of the claims put forth for the AMERICAN ORGAN, by hearing for themselves.

Agents and the musical public are informed that new styles of cases are in active preparation.

☞ An elegantly Illustrated Circular, containing descriptions and prices, will be sent, postpaid, on application.

S. D. & H. W. SMITH, Boston, Mass.

Prices Reduced.



LEFFEL'S DOUBLE TURBINE.—Best Water Wheel in Existence. Send for New Price List, adopted June 1, 1870.

Also, for large Wheel Book, for 1870, JUST OUT. Sent free by addressing the manufacturers.

JAMES LEFFEL & CO.,
Springfield, Ohio, and New Haven, Conn.

REYNOLDS & CO.,

MANUFACTURE

Screws & Bolts

For Machinery of every variety. Also, Bridge and Roof Bolts. STEEL AND IRON

Set Screws

A Specialty. Also, Small Articles for Patentees in great numbers at No. 145 East st., New Haven, Conn.

IRON STEAMSHIP BUILDERS.

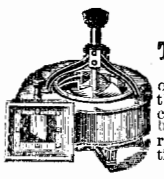
NEAFIE & LEVY,

PENN WORKS,

MARINE ENGINES, BOILERS, ETC.,
PHILADELPHIA, PA.

PATENTS NEGOTIATED.—Inclose stamp for circular. GERNER & TYLER, 258 Broadway, N. Y. P. O. Box 4,544

MORRISON & HARMS' IMPROVED MULEY Saw Hangings, built entirely of metal, are adapted to any upright Saw Mill. Require no Millwright work to set them up, and are the cheapest and best in use. MORRISON & HARMS, Allegheny City, Pa.



Reynolds'

Turbine Water Wheels.

The Oldest and Newest. All others only imitations of each other in their strife after complications to confuse the public. We do not boast but quietly excel them all in staunch reliable, economical power. Beautiful pamphlet free. GEO. TALLCOT, 96 Liberty st., New York.

Gearing Shafting.

A. J. Bicknell & Co.,

TROY, N. Y., and SPRINGFIELD, ILL., Publish and send, Charges Paid, on receipt of price,

Bicknell's Village Builder.....$10
Cummings & Miller's Architecture.....$10
" " Modern Architecture.....$10
Loth's Practical Stair Builder.....$10

☞ Catalogues mailed free to any address.

WIRE ROPE.

JOHN A. ROEBLING'S SONS,
Manufacturers, Trenton, N. J.

FOR Inclined Planes, Standing Ship Rigging, Bridges, Ferries, Stays or Guys on Derricks & Cranes, Tiller Ropes, Sash Cords of Copper and Iron, Lightning Conductors of Copper. Special attention given to hoisting rope of all kinds for Mines and Elevators. Apply for circular, giving price and other information. Send for pamphlet on Transmission of Power by Wire Ropes. A large stock constantly on hand at New York Warehouse No. 117 Liberty st.

Leffel's Double Turbine

Is manufactured by POOLE & HUNT, Baltimore.
☞ Send for Pamphlet and Price List.

MACHINERY, New and 2d-Hand.—Send for circular. CHAS. PLACE & CO., 60 Vesey st. New York.

Newspaper Advertising.

A Book of 125 closely printed pages, lately issued, contains a list of the best American Advertising Mediums, giving the names, circulations, and full particulars concerning the leading Daily and Weekly Political and Family Newspapers, together with all those having large circulations, published in the interest of Religion, Agriculture, Literature, etc., etc. Every Advertiser, and every person who contemplates becoming such, will find this book of great value. Mailed free to any address on receipt of 25c.

GEO. P. ROWELL & CO.,
Publishers, No. 40 Park Row, New York.

The Pittsburgh (Pa.) Leader, in its issue of May 29, 1870, says:

"The firm of G. P. Rowell & Co., which issues this interesting and valuable book, is the largest and best Advertising Agency in the United States, and we can cheerfully recommended it to the attention of those who desire to advertise their business **scientifically** and **systematically** in such a way: that is, so as to secure the largest amount of publicity for the least expenditure of money."

FOR SALE.—All the Steam Hammers and Machinery of the Franklin Forge. Apply to TUGNOT, THOMPSON & CO., 430 1st Avenue.

IMPORTANT

TO LUMBERMEN. — MORRISON & HARMS' Improved Muley Saw Hangings are pronounced by all to be the greatest improvement of the age. The motion imparted to the saw by these hangings will enable it to perform from 50 to 100 per cent more work with the same power than with any other in use. They are built from the best material, in a superior manner, and guaranteed to perform all that they are recommended to do. Address MORRISON & HARMS, 386 River ave., Allegheny City, Pa.

LAMB KNITTING MACHINE

THE ONLY FAMILY KNITTER MADE that fills the bill. Send for circulars and samples to LAMB KNITTING MACHINE M'F'G CO., Chicopee Falls, Mass.

EMPLOYMENT.

$250 A MONTH with Stencil Dies. Samples free. Address
S. M. SPENCER, Brattleboro, Vt.

PATENT COLD ROLLED SHAFTING.

The fact that this shafting has 15 per cent greater strength, a finer finish, and is truer to gage, than any other in use, renders it undoubtedly the most economical. We are also the sole manufacturers of the CELEBRATED COLLINS PAT. COUPLING and furnish Pulleys, Hangers, etc., of the most approved styles. Price lists mailed on application to JONES & LAUGHLINS,
120 Water st., Pittsburgh, Pa.

☞ Stocks of this shafting in store and for sale by FULLER, DANA & FITZ, Boston, Mass. GEO. PLACE & CO., 126 Chambers st., New York.

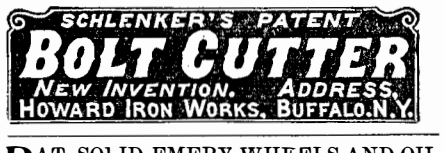
OTIS' SAFETY HOISTING *Machinery.*

OTIS BROTHERS & CO.,
NO. 309 BROADWAY, NEW YORK.

THE

Tanite Emery Wheel.

Does not Glaze, Gum, Heat, or Smell. Address
THE TANITE CO.,
Stroudsburg, Monroe Co., Pa.



PAT. SOLID EMERY WHEELS AND OIL STONES, for Brass and Iron Work, Saw Mills, and Edge Tools. Northampton Emery Wheel Co., Leeds, Mass.

IRON PLANERS, ENGINE LATHES, Drills, and other Machinists' Tools, of Superior Quality, on hand and finishing. For sale Low. For Description and Price, address NEW HAVEN MANUFACTURING CO. New Haven, Conn. 5 tf os

TRINIDAD ASPHALTIC PAVEMENT, For Streets, Carriageways, Walks, Floors, etc., E. W. RANNEY, Patentee.

One continuous piece, not injured by heat or frost. Impervious to grass, water, and noxious vapors. Town, County, State, and Individual rights for sale. Also, THE "PATENT TRINIDAD ASPHALTIC CEMENT," with which every one can lay his own pavement. Send for circular to E. W. RANNEY, General Agent, 440 W. 23d st., New York city.

SEAL ENGRAVERS' DIE LETTERS— Seals and Presses, Steel Dies, Brass Labels, Cutting Punches, Brass Stamps, Stencil Plates, Name Punches, Brands for burning, etc., etc., made by ROBERT ROGERS, 26 Spruce st. New York.

☞ T. V. Carpenter, Advertising Agent. Address hereafter, Box 773, New York city.

Harrison *Safety Boiler.*

First-class Medal, World's Fair, London, 1862. And American Institute Fair, New York, 1869

Over 1,000 Boilers in Use.

Weston's Patent Differential PULLEY BLOCKS.

75,000 IN USE.

Address

HARRISON BOILER WORKS,
Philadelphia, Pa.

or JOHN A. COLEMAN, Agent, 110 Broadway, New York, and 139 Federal st., Boston

DOYLE'S

PATENT DIFFERENTIAL

Pulley Blocks.

The celebrated **Doyle Blocks** have taken Premiums over the Differential Blocks of all other makers at every Fair where they have been exhibited at the same time. WHEN YOU BUY, SEE THAT THE BLOCKS ARE MARKED J.J. DOYLE. Pat'd Jan. 8, 1861. All others are infringements.

SAMUEL HALL'S SON & CO
SOLE MANUFACTURERS,
229 West 10th st., New York.

HEAVY CASTINGS For Forge and Mill Work. The M. & T. SAULT CO., Steam Engine Builders & Founders, New Haven, Conn.

CANVASSERS WANTED.

THE UNIVERSAL PARING KNIFE For Table Cutlery, Shears, and Scissors meets the great demand among Families, Hotels, and Restaurants, for an effective, simple, durable Sharpener. It meets with rapid sale at the low price of $1. Liberal discounts to Canvassers. Send for Sample or Illustrated Circular.
A. C. IVES, Sole Proprietor,
Office Meriden Cutlery Co., 45 Beekman st., New York.

McNab & Harlin,

Manufacturers of
Wrought Iron Pipe and Fittings, Brass Cocks, Valves Gage Cocks, Whistles, Water Gages, & Oil Cups, Harlin's Patent Lubricator, Plumbers' Brass Work, Getty's Patent Pipe Cutter, Getty's Patent Proving Pump and Gage. No. 86 John st., New York.

American Saw Co., Manufacturers of

And Perforated Circular, Long, and Hand Saws. Also Solid Saws of all kinds. No 1, Ferry st., cor. Gold st., New York. Branch Office for Pacific coast, No. 606 Front st., San Francisco, Cal.

London.....48 Cannon street.

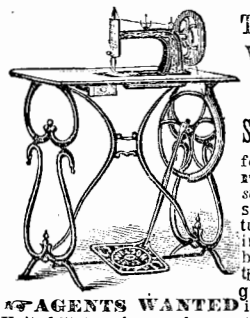
H. KOHNSTAMM,
Manufacturer of

ULTRAMARINE,

and Importer of English, French, and German Colors Paints, and Artists' Materials, Bronzes, and Metals. No 100 Chambers st., between Broadway & Church st., N.Y

TRADE MARK.

SOLID EMERY WHEELS are guaranteed superior to any now in the market, and sent out on trial.
Price list upon application.
UNION STONE CO.,
32 Pemberton Square,
Boston, Mass.



THE IMPROVED

WILSON SHUTTLE SEWING MACHINE

for **simplicity, durability & beauty** *stands unrivaled!* For stitching, hemming, tucking, felling, quilting, cording, binding, braiding, gathering, gathering and sewing on gathers, *it is unexcelled!*

☞ **AGENTS WANTED** in every County in the United States where we have not one already employed. For particulars address Wilson Sewing Machine Co., Cleveland, O.; Boston, Mass., or St. Louis, Mo.

BAND SAWS.

PATENT BAND SAW MACHINES, MADE by Perin & Co. for Log, Re-sawing, and Scroll. Mongin & Co.'s Saw Blades, in stock and made to order from ⅜ to 6 inches wide, 50 ft. long. Saws and Machines Warranted.

Also, Taper Files, etc.

All Styles of Band Saw Machines in operation at Mahogany Mill, 10th st., E. R.
GEORGE GUEUTAL,
Sole Agent for the U. S., 39 West 4th st., N. Y

Working Models

And Experimental Machinery, Metal or Wood, made to order by J. F. WERNER, 62 Center st., N. Y.

$3.—THE AMERICAN BUILDER—One of the most valuable monthly publications of the day. Send $3 for the BUILDER, and get in addition the splendid premium of Ritchie's Irving, a fine steel engraving, size 24x32. CHAS. D. LAKEY, Publisher, 151 and 153 Monroe st., Chicago.

PATENT IMPROVED
STEAM HAMMERS,
From 100-lbs. upwards.
FERRIS & MILES, 24th and Wood sts., Philadelphia

THE SCIENTIFIC AMERICAN is printed with Ink furnished by CHAS. ENEU JOHNSON & CO., Tenth and Lombard sts., Phil'a. 59 Gold cor. Ann st., New York.

© 1870 SCIENTIFIC AMERICAN, INC.